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# Development of Post-Distance Education School Adjustment Scale: Validity and Reliability Study

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## Abstract

In this study, it was aimed to develop a scale to measure the school adjustment levels of university students after distance education. 35 draft items were prepared in line with the literature review and expert opinions. After the opinions of the field experts, necessary corrections were made in the draft scale form and a 32-item scale was reached. The data were collected from 437 university students. As a result of the Exploratory Factor Analysis (EFA), a three-dimensional structure consisting of 21 items and three dimensions as "Social Adjustment", "Adjustment with Faculty Members and Students" and "Affective Adjustment" and explaining 50.45% of the variance was reached. Fit indices calculated by confirmatory factor analysis (CFA) were obtained as $\chi^2/Df=3.29$, RMSEA= 0.073, CFI= 0.92, GFI= 0.91, AGFI= 0.88. These observed values show that the model has an acceptable goodness of fit. When the items with low factor scores and items in other dimensions were examined, it was seen that the model fit indices were at the desired level after 5 items were excluded from the scale. The alpha reliability of the whole scale was determined as 0.89. Alpha reliability for each component was calculated as 0.88, 0.82 and 0.79, respectively. The results show that Post-Distance Education School Adjustment Scale is a valid and reliable measurement tool that can measure university students' adjustment to school after distance education.

**Keywords:** Adjustment, Distance education, Pandemic, Measurement, University students

## Introduction

As a result of developments in communication technologies, distance education has started to become widespread rapidly. The reason for the widespread use of distance education is the advantages it has. The advantages of distance education in research on distance education are that it is carried out in a certain system and plan, is learner-centered, flexible in terms of time and place, and can be repeated (Oliveira, Penedo & Pereira, 2018). In addition to the stated advantages of distance education, it also has some disadvantages in terms of learning, teaching and content, which are the components of education and training. These components in the distance education model should be compatible with the learning outcomes (Carswell & Venkatesh, 2002). Research results on distance education show that distance education has many disadvantages such as causing distraction, restricting social interaction, reducing face-to-face communication between the teacher and the learner, the invalidity of the programs graduated with online education in the business world, requiring technology literacy and being costly. (Dyrud, 2000; Fojtik, 2018). It has been revealed that students who continue their education life with distance education during the pandemic process are faced with problems such as a feeling of loneliness, a decrease in the level of happiness and physical activity (Lee, Ward, Chang & Downing, 2021; Munasinghe et al., 2020). This situation causes teachers to think that students may have social and psychological effects such as depression, decreased sense of belonging to school, lack of interaction, loss of motivation (Karakaya et al., 2021). Although there are many measurement tools (Akar-Vural et al., 2013; Alkan, 2016; Arslan & Duru, 2017; Baker & Siryk, 1989; Durnalı, Filiz & Aydın, 2018; Slaten et al., 2018; Whiting, Everson & Feinauer, 2018) developed for school adjustment in the literature, these measurement tools have been developed to reveal students' level of school adjustment in general. In addition, there is no measurement tool about university adjustment after distance Education. Therefore, after the Covid-19 pandemic, the need to determine students' adjustment to school arose. In this study, it was aimed to develop a scale to measure the school adjustment levels of university students after distance education. It is expected that the scale developed in this direction will eliminate this deficiency in the field and contribute to the field.

## Literature Review

Conducting education and training activities, one of the important priorities of societies, within the framework of a good plan and program has

become one of the most important problems today. Some social, natural disasters and epidemics have made it necessary to carry out education and training activities in different ways. To solve such problems, trends from face-to-face education activities to distance education have started. To define the concept of distance education, which was introduced in the 1800s; it can be expressed as an activity in which the teacher and the learner exchange information at a distance from each other (Schlosser & Anderson, 1994). Keegan (1986), on the other hand, defines distance education as the learning process that the teacher and the learner carry out separately, away from each other, unlike the traditional face-to-face education. According to Garrison and Shale (1987), distance education is a process in which the communication between teachers and students is not face-to-face and technology is used to provide this communication to carry out and support the education process easily. In the most general sense, distance education can be defined as the realization of educational activities by means of technology away from each other, where the teacher and the learner do not interact face to face (Johnson, 2003; Moore, 1993). In this sense distance learning is a pedagogical approach which enables the delivery of educational material to students regardless of time or location via a virtual environment (Yamamoto & Altun, 2020).

The need to continue education, which arises as a result of some sociological phenomena, natural disasters and epidemics experienced by societies, is met in different ways by the concept of distance education, which has a history of approximately two hundred years (Garrison, 1993). Although the distance between the teacher and the learner, who are the components of the process in distance education, is seen as a situation that will disrupt the education process, this process ensures that teachers and learners have equal opportunities (Bunker, 2003; Katane, Kristovska & Katans, 2015; Oliveira, Penedo & Pereira, 2018).

Considering the historical development of distance education, according to some sources, it first appeared in an advertisement called "Composition Through Newspaper" published in Sweden in 1833 (Simonson, Smaldino & Zvacek, 2015; Schlosser & Anderson, 1994). In 1840, the postal service called “Penny Post” established in England allowed Isaac Picman to teach shorthand by correspondence (Holmberg, 1986). In 1856, a foreign language school teaching French and Spanish by letter was established in Germany by Charles Toussaint and Gustav Langenscheid (Schlosser & Simonson, 2009). As a term, distance education was first mentioned in a catalog published by the University of Wisconsin in 1892 (Moore, 1987). In 1948, Japan provided the opportunity to receive distance education to its soldiers and middle school, high school and higher education students who could not attend school due to different reasons (Kırık, 2014).

In the 1980s, distance education applications made through letters, radio, television, and videotape gained a different dimension, especially with the widespread use of computers and the Internet (Hanson et al., 1997). Distance education, which was seen to be carried out through newspapers, mail, radio and television broadcasts until the end of the twentieth century, has left its place to more advanced technological tools such as computers, smart phones and tablets in the 21st century as a result of the transfer of educational materials to digital media thanks to the internet network. (Arat & Balkan, 2011; Üstün & Özçiftçi, 2020). As the costs of technologies such as computers, tablets, smartphones and the internet decrease, distance education applications have become widespread and internet-based education applications have started to be seen more frequently today (Allen & Seaman, 2011; Avşar, 2011).

Distance education practices in Turkey were first included in the Teacher Education Report presented by John Dewey (İşman, 2008). The establishment of the Letter Teaching Center in 1961 was one of the first steps taken officially (Çukadar & Çelik, 2003). With the establishment of Anadolu University Open Education Faculty in 1982, distance education applications started at the higher education level (Kırık, 2014). In 1989, Middle East Technical University started computer-assisted teaching activities with a distance education model (Çukadar & Çelik, 2003). In the 2001-2002 academic year, associate degree programs were opened for the first time on the internet within Anadolu University (Mutlu, Özöğüt Erorta, Kip Kayabaş, & Kayabaş, 2014). In 2013, with the regulations made in the higher education law numbered 2547, it was decided that common compulsory courses such as Atatürk's Principles and History of Revolution, English, Turkish Language, and Information Technologies could be given via distance education (YÖK, 2013). With this decision, distance education centers were established in approximately 60 universities in 2016. By 2019, the number of universities with distance education centers reached 106 (Kırkan & Kalelioğlu, 2017). The COVID-19, affecting the whole world in March 2020, also affected Turkey and made the transition to distance education compulsory in all education levels from kindergarten to higher education.

## Methodology

### *Research Design*

The purpose of this study is to develop Post-Distance Education School Adjustment Scale and define psychometrical aspects of it. In this study, survey model, which is one of the quantitative research methods, was used. The survey model is a research model that aims to determine the existence and degree of the formation of variables individually in terms of

type or quantity, or the existence and degree of co-variation between two or more variables (Karasar, 2005).

***Study Group***

The sample of the research consists of 437 students studying at the 3rd and 4th grade levels of the Faculty of Education, Niğde Ömer Halisdemir University in the 2022-2023 academic year. Of the 437 students who voluntarily participated in the application, 266 were female and 171 were male.

***Data Analyis***

The data collected based on student opinions with the Post-Distance Education School Adjustment Scale were analyzed using SPSS 25.0 (Statistical Package for Social Sciences) and Amos 26 program, with negative items being scored negatively. After this stage, outlier analysis was carried out first and it was decided to exclude the data of 8 students from the analysis due to the extreme value. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) test was conducted to assess the appropriateness of the collected data for factor analysis. Subsequently, factor analysis was employed to assess the construct validity of the scale. To determine the factor structure of the scale, principal component analysis, rotated according to the principal components (varimax rotated) in factor analysis methods, was used. Exploratory Factor Analysis (EFA) was first conducted to assess the construct validity of the data obtained from the scale. In determining the items to be included in the scale as a result of the EFA, attention was paid to ensure that the eigenvalues of the items were 1 and the item load values were at least .30 (Büyüköztürk, 2004). The reliability of the scale was also checked with internal consistency coefficients (Cronbach Alpha). To determine the distinctiveness of the items in the Post-Distance Educational School Adjustment Scale, item-total test correlations were examined, and factor eigenvalue calculations were made to determine the scale factors. The model fit was tested with confirmatory factor analysis (CFA) of the item-factor structure obtained from the exploratory factor analysis. Amos 26 was used for confirmatory factor analysis.

***Research Procedures***

In the preparation of the Post-Distance Education School Adjustment Scale, first, the literature on the subject was reviewed in detail, and it was planned to create an item pool on school adjustment after distance education. Based on the studies on the subject in the literature and considering the main elements that describe academic belonging, an item pool consisting of 35 items that can be an indicator of students' adjustment to school has been

determined. After the item pool was created, the opinions of five experts in the fields of education administration and supervision, measurement and evaluation, Turkish education, psychological counseling and guidance, curriculum and instruction were sought to ensure the scope and face validity of the draft scale. In evaluating the clarity of the items and how appropriate they are for the structure to be measured, seeking expert opinion also serves many purposes related to increasing the content validity of the scale at the highest level (DeVellis, 2017). In this context, it was aimed to evaluate the scale items requested from the experts in terms of content validity and to determine whether the scale measures the level of school adjustment of the students after the distance education application. A form was created by triple-grading the items submitted to the expert opinion, the experts were asked to mark one of the "appropriate", "not appropriate" and "must be corrected" options for each of the items. In line with the expert opinions received, the items were revised; Some items were removed from the scale, and some items were corrected to make them clearer and more understandable. After the opinions of the field experts, necessary corrections were made in the draft scale form and a 32-item scale was reached. 29 of the items consist of positive statements and 3 of them are negative statements. A 5-point Likert-type rating approach was used to express the level of participation of the students about the items in the scale. This rating: It was formed as “I totally agree (5), I agree a lot (4), I agree somewhat (3), I agree a little (2) and I do not agree at all (1)”. To determine whether the 32 items in the scale are sufficiently understandable by university students, a preliminary application was made on a small group of 50 students. At the end of the pre-application, it was determined that the items were sufficiently understood by the students.

## Findings

For the construct validity of the scale, EFA was performed on the collected scores. The structure obtained as a result of EFA was tested with CFA. Statistical operations are presented in order.

### *Exploratory Factor Analysis*

Before the factor analysis of the scale was performed, KMO test was performed on 32 items in the trial form of the scale to determine the suitability of the data for factor analysis. The data obtained from this test are given in Table 1.

**Table 1.** First KMO Test Results Before Rotation

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin (KMO) | | .924 |
| Bartlett Test | $\chi^2$ | 6811.417 |
| | df | 496 |
| | p | .000 |

KMO fit value before the rotation was .924 and the significance level of the Bartlett sphericity test was .000 (for $p \leq 0.05$), which indicates that the data are suitable for factor analysis. As a result of the first analysis, the items that could not get a load value above the acceptance level in any factor and a total of 11 items with a load value less than .1 between the two factors were accepted as non-functioning items and were removed from the scale. Factor analysis was performed for 21 items with factor load values greater than .40 as a result of the initial analyses and accepted to be functional. 19 of these items contain positive statements and 2 of them contain negative statements. To make the second factor analysis, KMO coefficient was calculated again, and Bartlett's Sphericity test was applied. The data obtained from this test are given in Table 2.

**Table 2.** Second KMO Test Results Before Rotation

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin (KMO) | | .901 |
| Bartlett Test | $\chi^2$ | 4288.693 |
| | df | 253 |
| | p | .000 |

For rotation purposes, the second KMO coefficient was calculated as .901, while Bartlett's Sphericity value was determined to be ($\chi^2$=4288, $p<.05$). The fact that the Bartlett's Sphericity significance value is less than .05 indicates that the factor can be removed from the correlation matrix. In other words, a KMO higher than .60 indicates that Bartlett is significant (Büyüköztürk, 2004). Three factors were determined as a result of the rotation (Varimax rotated) process. The number of items collected in these factors is 9 in the first factor, 8 in the second factor, and 4 in the third factor. The determined factors were named by considering the factors in the school adjustment tests. In this direction, the 1st factor was determined as "Social Adjustment", the 2nd factor as "Adjustment with Faculty Members and Students" and the 3rd factor as "Affective Adjustment". As a result of the Varimax rotated operation performed to analyze the principal components of the factors, the factor loading values of the items in the scale were calculated and the data obtained are shown in Table 3.

**Table 3.** Factor Loading Values of the Items of the Post-Distance Education School Adjustment Scale after Varimax Rotation

| Item | Factor Loadings Before Rotation | Social Adjustment | Adjustment with Faculty Members and Students | Affective Adjustment | Item-Total Correlation |
|---|---|---|---|---|---|
| 8 | ,765 | ,815 | | | ,604 |
| 4 | ,743 | ,746 | | | ,464 |
| 16 | ,678 | ,736 | | | ,578 |
| 25 | ,632 | ,693 | | | ,522 |
| 7 | ,659 | ,680 | | | ,621 |
| 11 | ,597 | ,631 | | | ,704 |
| 3 | ,635 | ,591 | | | ,586 |
| 5 | ,573 | ,569 | | | ,568 |
| 12 | ,546 | ,543 | | | ,549 |
| 27 | ,767 | | ,774 | | ,603 |
| 26 | ,632 | | ,696 | | ,537 |
| 29 | ,694 | | ,671 | | ,532 |
| 31 | ,581 | | ,662 | | ,449 |
| 32 | ,663 | | ,650 | | ,595 |
| 24 | ,663 | | ,619 | | ,550 |
| 14 | ,437 | | ,478 | | ,304 |
| 20 | ,418 | | ,422 | | ,310 |
| 13 | ,738 | | | ,763 | ,430 |
| 9 | ,726 | | | ,751 | ,584 |
| 23 | ,623 | | | ,726 | ,365 |
| 17 | ,671 | | | ,703 | ,576 |

In Table 3, it can be observed that the factor load values of the items comprising the Post-Distance Education School Adjustment Scale range from .418 to .767 prior to varimax rotation, while the load values after rotation range from .422 to .815. When the item factor load values of the factors forming the subsections are examined separately, the factor load values of the items constituting the first factor (Social Adjustment) were between .543 and .815, the factor load values of the items constituting the second factor (Adjustment with Faculty Members and Students) were between .422 and .774, and the factor load values of the items constituting the third factor (Affective Adjustment) were .703. It is seen that it varies between .763 and .763. To determine the distinctiveness of the items in the Post-Distance Education School Adjustment Scale, item-total test correlations were examined. When Table 3 is examined, it is seen that the item-total test correlation values of the scale vary between .304 and .704. Considering that items with an item-total test correlation value higher than .30 in the scale generally have good discrimination (Şencan, 2005), it can be

said that the discrimination of the items in the Post-Distance Education Scale of Adjustment to School is generally high.

**Table 4.** Explained Variances and Eigenvalues Related to the Scale

| Factor | Eigen Values | Percentage of Variance | Total Percentage of Variance |
|---|---|---|---|
| 1 | 7.56 | 32.89 | 32.89 |
| 2 | 2.16 | 9.40 | 42.29 |
| 3 | 1.87 | 8.15 | 50.45 |

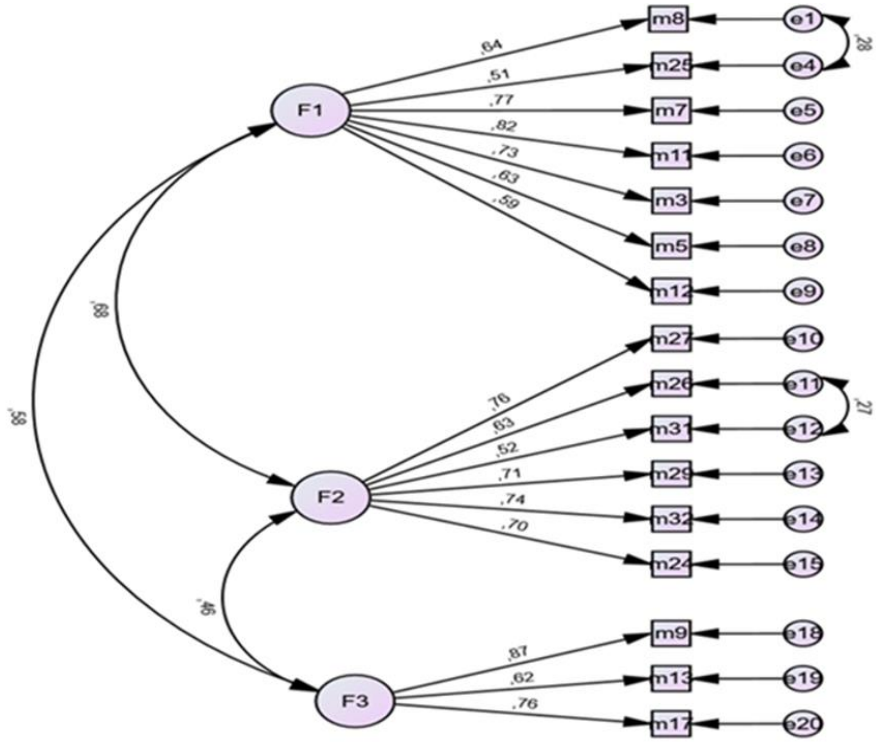
Table 4 shows that the first factor explains 32.89% of the total variance, the second factor explains 9.40% of the total variance, and the third factor explains 8.15%. Total variance explained by three factors is 50.45%. It is said that the total variance explained should be 30% or more in single-factor scales and more in multi-factor scales (Büyüköztürk, 2010). In this context, it can be said that the total variance (50.45%) explained by the three factors in the scale is sufficient. The alpha reliability of the whole scale was determined as 0.89. Alpha reliability for each component was calculated as 0.88, 0.82 and 0.79, respectively. It is observed that the reliability coefficients obtained are quite high. These findings can be accepted as an indication that the scale measures reliable.

***Confirmatory Factor Analysis***

The model obtained as a result of the CFA, which was carried out to obtain evidence for the validity of the three-factor structure of the Post-Distance Education School Adjustment Scale determined through the EFA, is given in Figure 1.

Considering the correlation squares between the factor load values of the items and the item error terms in different dimensions, it was tried to reach a scale structure whose fit indices were within acceptable reference ranges. While it is desired that the standardized factor loading values should not be below 0.4, the squares of the correlation coefficients between the error terms of the items belonging to different dimensions should be lower than the squares of the correlation between the error terms of the items of the same size. In this context, standardized factor score estimation values and error terms correlation squares matrix were examined. The correlations between the error terms of the items in the same dimension were combined with covariance paths to correct them. The covariance coefficients between the mentioned covariance paths and error terms are as follows; m8-m25 Cov=.28, m26-m31 Cov=.27. Among the mentioned corrections, when the items with low factor scores and items in other dimensions were examined, it was seen that the model fit indices were at the desired level after some items were excluded from the scale.

The fit indices calculated by CFA were obtained as RMSEA= 0.07, CFI= 0.92, GFI= 0.91, AGFI= 0.88. These values show that the model fit is achieved. It was observed that the $\chi^2$=326.61 (df=99) statistic was significant (p<.01) and it was calculated as $\chi^2$/sd =3.29. This observed value shows that the model has an acceptable goodness of fit (Anderson & Gerbing, 1984).




CMIN/df:3,299; AGFI:,883; GFI:,915; NFI:,895; CFI:,924; IFI:,924; TLI:,907; RMSEA:,073

**Discussion and Conclusion**

In this study, a 35-item scale, which was prepared to measure university students' adjustment to school after distance education, was applied to 437 students studying in the 3rd and 4th grades. After expert opinions, it was decided to remove 3 items from the scale and the factor structure of the scale was examined over 32 items. EFA with Varimax rotation revealed a 3-factor structure consisting of 21 items. 19 of the scale items are positive and 2 of them are negative items. The components are named as Social Adjustment, Adjustment with Faculty Members and Students, and Affective Adjustment, respectively. In the factor analysis of the scale, the EFA method was first used. In this context, the KMO test was found to be .924 in the analysis performed to determine the suitability of the data obtained with the first version of the scale for factor analysis. As a result

of the factor analysis, 11 items were removed from the scale and 21 items with factor loads ranging from .418 to .767 were included in the scale. For rotation purposes, the second KMO coefficient was calculated as .901, while Bartlett's Sphericity value was determined to be ($\chi^2$=4288, p<.05). The fact that the Bartlett's Sphericity significance value is less than .05 indicates that the factor can be removed from the correlation matrix. In other words, a KMO higher than .60 indicates that Bartlett is significant (Büyüköztürk, 2004). Three factors were determined as a result of the rotation (Varimax rotated) process. The number of items collected in these factors is 9 in the first factor, 8 in the second factor, and 4 in the third factor. The determined factors were named by considering the literature and factors in the school adjustment scales. In this direction, the 1st factor was determined as "Social Adjustment", the 2nd factor "Adjustment with Faculty Members and Students" and the 3rd factor as "Affective Adjustment". Fit indices calculated by CFA, RMSEA= 0.073, CFI=0.92, GFI=0.91 and AGFI = 0.88. These values show that the model fit is achieved. It was observed that the $\chi^2$=326.61 (df=99) statistic was significant (p<.01) and it was calculated as $\chi^2$/sd =3.29. This observed value shows that the model has an acceptable goodness of fit (Anderson & Gerbing, 1984). The correlations between the error terms of the items in the same dimension were combined with covariance paths to correct them. The covariance coefficients between the mentioned covariance paths and error terms are as follows; m8-m25 Cov=.28, m26-m31 Cov=.27. Among the mentioned corrections, when the items with low factor scores and items in other dimensions were examined, it was seen that the model fit indices were at the desired level after some items were excluded from the scale.

**Conflict of Interest:** The author reported no conflict of interest.

**Data Availability:** All of the data are included in the content of the paper.

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