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Structural equation modeling in readiness, willingness and anxiety of secondary school students about the distance learning

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Abstract

In recent years, distance education is one of the educational practices used. Distance education which was performed in past for the persons and adults who didn't participate to education, is planned and carried out in high education for preparing the students. With this sight, the consciousness of what's the distance education, the willingness for participation in like this education, the level of readiness and anxiety are the factors that provide to be successful in distance education and to go on for system. In this context, it is aimed that the contact in between readiness and willingness through structural equation modeling and research. With this aim, 777 secondary school students selected by Convenience sampling method will be formed with the sampling of research. The questionnaire formed 3 scales that done validity reliability research and an information form will be practiced to students taken part in study group. In addition to the willingness for distance education, readiness for distance education and anxiety scale for distance learning, information questions which contain demographic feature were added to this questionnaire. The questionnaire will be carried out to deliver by hand and the data will be researched with the equation modeling by entering to LISREL 8.54 packet program. It's found that readiness for distance learning and the level of willing is high but the level of anxiety is low. In addition to, it's found that the level of readiness anxiety of secondary school students for distance education, readiness, willingness must be significant.

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1. Introduction

The education which is more and more common in nowadays is an application of education is performed in where students and teachers are not at the same place and teacher use technology based. This is a kind of teaching learner in which is at different place and different time from teacher and in between them communication and interaction in printed or electronic communication media according to Aydın (2005). While distance learning expresses the situation of being time and place between student and teacher, correspondence school generally describes as an education system that contains learning phases used in higher education and initially organized, voluntary or compulsory education (Selvi, 2006).

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Lately in a way of distance education, in universities in Turkey variety of programs have been opened. More and more increasing programs show variety as associate, degree, degree completion and graduate. In general universities opened distance learning programs in addition to face to face programs and point to attend distance learning is lower than face to face program (OSYM prefer manual, 2011).

For being successful in distance learning, features of students accepted in distance learning lessons, it is required to be careful that learning willingness and motivations, attitudes related in learning, attitudes related in technology, self-confidence, anxiety, beliefs and values (Reeves & Bracket).

In this research, these features of students' level of anxiety will be checked. While Rachmen (1998) describes as a blur horror expectation, Barlow (1988) indicates that anxiety is considered as horror components (Williams, 2010: 2).

The amount of e-mail correspondence between students and faculty, differences in student demographics, high student anxiety due to taking a distance course for the first time, and the difficulties in using technology to deliver the asynchronous course also had an impact on the success of this study (Bender, Wood & Vredevoogd, 2004)

In research of Conrad (2002), when they asked on the survey to provide an adjectival description of their feelings when starting a new course online, learners responded with descriptions of fear and anxiety. A number indicated eagerness and excitement. In some cases, this was coupled with statements of apprehension. This response held true among the program's novice learners who were beginning their first online course; among the program's experienced online learners who had completed one or more courses and among nonprogrammer learners who were taking courses as electives. Many no novice learners had completed more than four online courses at the time of the study. According to Conrad (2002), adult educators recognize learners' level of anxiety as they begin new learning endeavors. The study asked learners to describe course beginnings that had met their needs and propelled them to as strong a start as possible. Students' anxiety level who take online course for a first time, is universally high, even among those who have already completed many online course (Conrad 2002)

1.1. Research Model and Hypothesis

Even though there are many studies related to distance learning, a study, which examines the relationship between high school students' readiness, willingness and anxiety for distance learning, has not been found among these studies. The purpose of this study is to examine the relationship between the levels of high school students' readiness, willingness and anxiety distance learning. The hypotheses below have formed a frame for the study.

1. High school students' anxiety for distance learning predicts their willingness for it.
2. High school students' anxiety and willingness for distance learning predict their level of readiness for it.

2. Method

2.1. Participant

The participants have been formed with 800 students who have been studying in high schools in Afyon, Ankara and Kayseri cities. Because 23 students of the total students in these cities in which the study group was formed lack some information, those students' scales have been excluded from the study. As a result, the study has been carried out over the data of 777 students.

Out of 777 students, 166 students (21.2 %) in the study group attend school in Afyon. 305(39.3%) of them are in Ankara and 308(39.5%) of them attend school in Kayseri.282 (36.3%) of these students are girls and 495 (63.7%) of them are boys.59 (7.6%) students have stated that they had distance education before. However, 718(92.4%) students have said that they did not have distance education before.174 (22.4%) students have said that they know somebody who has distance education. 603(77.6 %) students have said that they do not know anybody who has

distance education. 198 (25.5 %) students have said that they can have distance education. However, 579 (74.5%) students have stated that they do not want to have distance education.

2.2. Tools

Within the scope of this study, the data, which has been obtained from high school students, have been collected with the scales of anxiety, willingness and readiness towards distance learning.

2.2.1. Distance Learning Anxiety (DLA) Scale

DLA scale has been used to determine the levels of anxiety of high school students for distance learning. The scale consists of one factor and six items and it is in the form of a 5-point Likert scale. The scale has been developed by researchers. For this scale, the opinions of three experts on distance education have been received. For the validity test of the scale, exploratory and confirmatory factor analyses have been used and for the reliability test, Cronbach Alpha internal consistency coefficient has been used. Through exploratory factor analysis, the scale was found to be one factor and have accounted for 65.30 % of total variance. After second-order confirmatory factor analysis, consistency indices were found to be $\chi^2/df = 4.02$, RMSEA = 0.078, SRMR = 0.013, CFI = 0.99, NFI = 0.99, NNFI = 0.99, GFI = 0.99 and AGFI = 0.95. The internal consistency coefficient of Turkish scale was 90. As a result of the validity and reliability analyses, the scale was considered to be in the form of one factor and 6 items. The sample item of the scale was "I feel anxious when I consider having distance education."

2.2.2. Distance Learning Willingness Scale (DLW)

DLW scale has been used to determine the levels of willingness of high school students for distance learning. The scale consists of 2 factors and 10 items and it is in the form of 5-point Likert type scale. It has been developed by the researchers and opinions of 3 experts on distance education have been received. For the validity of the scale, exploratory and confirmatory factor analyses have been used and for the reliability of the scale, Cronbach Alpha internal consistency coefficient has been applied. The scale was found to be 2 factors and have accounted for 65.02 % of total variance.

The first factor of the scale was formed with 6 items and accounted for 53.17 % of total variance. This factor was named "finding distance education useful." The sample item of the factor was "I can meet my needs through distance education." Second factor of the scale was formed with four items and accounted for 11.85 % of total variance. This factor was named "enjoying distance education." The sample item of the scale was "I can say that I will enjoy learning through distance education."

Because of second-order confirmatory factor analysis, internal consistency indices were found to be χ^2 (chi-square)/df (degree of freedom) equals 2.71. RMSEA (Root Mean Square Error of Approximation) equals 0.047 and SRMR (Standardized Root Mean Squared Residuals) equals 0.030. CFI (Comparative Fit Index) equals 0.99 and NFI (Normed Fit Index) equals 0.99. NNFI (Non-Normed Fit Index) equals 0.99 and GFI (Goodness of Fit Index) equals 0.98 and AGFI (Adjusted Goodness Fit Index) equals 0.96. The internal consistency coefficient of Turkish was 90. The internal consistency coefficient of finding distance education useful factor of the scale was 89 and the internal consistency coefficient of enjoying distance education factor of the scale was 80. As a result of validity and reliability measurements, the scale was found to be 2 factors and in the form of 10 items.

2.2.3. Distance Learning Readiness Scale (DLR)

DLR scale has been used to determine the levels of readiness of high school students for distance learning. The scale consists of 2 factors and 9 items and it is in the form of 5-point Likert type scale. Researchers have developed the scale and opinions of three experts on distance education have been received. For the measurement of the scale validity, exploratory and confirmatory factor analyses have been done and for the scale reliability, Cronbach Alpha internal consistency coefficient has been applied. In the exploratory analysis process, the scale was found to be 2 factors and have accounted for 66.87 % of total variance.

The first factor of the scale was formed with five items and accounted for 55.34 % of the variance. The factor was named independent distance learning and control. The sample item of the scale is “I can apply my own study timetable in distance education.” The second factor of the scale was formed with 4 items and accounted for 11.53 % of total variance. This factor was named motivation for distance learning. The sample item of the factor is “I feel confident in learning through distance education.”

Because of second-order confirmatory factor analysis, internal consistency indices were found to be $\chi^2/df = 4.37$, RMSEA = 0.066, SRMR = 0.034, CFI = 0.99, NFI = 0.99, NNFI = 0.98, GFI = 0.97 and AGFI = 0.95. The internal consistency coefficient of Turkish scale was 90. The internal consistency coefficient of autonomous distance learning and control-factor was 87 and the internal consistency coefficient of enjoying distance-learning factor was 84. Because of the measurements of validity and reliability, the scale was found to be 2 factors and in the form of 9 items.

2.3. The collection and the Analysis of the Data

First, scales were published by receiving necessary permissions from high schools in Afyon, Kayseri and Ankara so that required applications could be performed and then they are applied according to the principal of voluntary participation. Student’ names and numbers were not taken in the application. The factors of the scales, which were used in the research and structural equation modeling, were used in order to examine the relationship between the three scales. These analyses were done with LISREL 8.54 packet program.

3. Findings

In the study, primarily descriptive statistics were analyzed for each scale and their factors. The results of the analysis are in Table 2.

When Table 1 is examined, it can be seen that students’ levels of anxiety are on an average level, however, they are not very low, either. This finding reveals the necessity of doing some studies to reduce students’ anxiety for distance learning. Furthermore, high school students’ willingness is close to average but it is seen that it is lower than average value. From this aspect, it is found out that there is a necessity of carrying out applications that will increase students’ willingness. Besides, it is seen that high school students’ readiness, autonomous learning-control and motivation are over the average level. With these findings, it is understood that high school students’ levels of readiness, willingness and anxiety for distance learning are on the average level.

Table 1. Descriptive Statistics

Variable	Mean	Std. Deviation	Standard Error.
DLA	2.83	1.08	0.04
DLW	2.77	0.97	0.04
Perceived Usefulness	2.72	1.08	0.04
Perceived Affection	2.85	1.06	0.04
DLR	3.43	0.96	0.04
Autonomy & Control	3.46	1.02	0.04
Motivation	3.39	1.10	0.04

3.1. A model Based on High School Students 'Anxiety, Willingness and Readiness for Distance Learning

While developing a structural equation modeling based on high school students' anxiety, willingness and readiness for distance learning, three latent variables, which are anxiety, willingness and readiness for distance learning, have been analyzed.

Table 3. The model's goodness-of-fit values

Fit indexes	Perfect fit	Model results
χ^2/df	$\chi^2/df < 3$	3.13
RMSEA	$0 < RMSEA < 0.05$	0.05
SRMR	$SRMR < 0.05$	0.029
CFI	$0.97 < CFI < 1$	0.99
NFI	$0.95 < NFI < 1$	0.99
NNFI	$0.97 < NNFI < 1$	0.98
GFI	$0.95 < GFI < 1$	0.98
AGFI	$0.90 < AGFI < 1$	0.95

The χ^2 (chi-square)/df (degree of freedom), Root Mean Square Error of Approximation (RMSEA), Root Mean Squared Residuals (RMR), Standardized Root Mean Squared Residuals (SRMR), Comparative Fit Index (CFI), Normed Fit Index (NFI), Non-Normed Fit Index (NNFI), Incremental Fit Index (IFI), Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI) were used to see the appropriateness of the goodness-of-fit of the model. The model's goodness-of-fit values are indicated in Table 3.

In Table 3, all of the indexes are perfect fit, demonstrating that the measurement model exhibited a good fit. Standard path coefficients of the structural model are given in Figure 4.

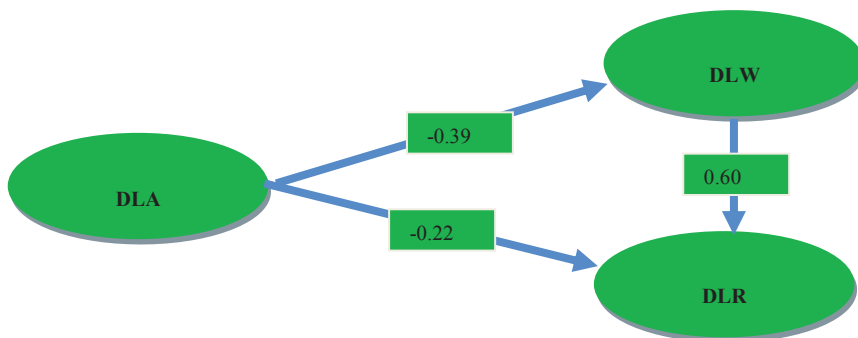


Figure1. The result of Model (standardized coefficients)

T-values between observed and latent variables and path coefficients are listed in Figure 1. Path coefficients, T-values and covariance matrix of latent variables are presented below Table 4 and 5:

Table 4. Path coefficients and T-values

Latent variables	Observed variables	Path coefficients	T-value
DLW	PU	0.84	15.98
	PA	0.75	14.89
DLR	AC	0.78	16.40
	M	0.85	17.46

All the coefficients between willingness for distance learning and its observed variables, readiness for distance learning and its observed variables are found to be significant ($p < .005$, $t > 1.96$). This result showed that PU and PA observed variables have significant positive influence on DLW. Furthermore, AC and M observed variables have significant positive influence on DLR.

Table 5. Covariance Matrix of Latent Variables

	DLA	DLW	DLR
DLA	1.00		
DLW	-0.39	1.00	
DLR	-0.22	0.60	1.00

When the effect of DLA on the DLW is examined, standardized path coefficient is found to be -0.39, and the t-value is found to be 5.09. Hence, this result supports the view that DLA has a significant negative effect on DLW ($p < .005$). In addition, it is found that DLA with its determinants accounted for approximately 4.8% (R^2) of the variance of DLW.

When the effect of DLA on the DLR is examined, the standardized path coefficient is found to be -0.22, and the t-value is found to be 6.64. Hence, this result supports the view that DLA has a significant negative effect on the DLR ($p < .005$). Similarly, it is found that DLA with its determinants accounted for approximately 4.8% (R^2) of the variance of DLR. When the effect of DLA and DLW on the DLR is considered, it is found that DLQ and DLW accounts for approximately 50% of variance of DLR.

Table 6. Estimated structural equation between latent variables

Relation latent variables	Estimated structural equation
DLW - DLA	DLW = 0.22*DLA, Errorvar.= 0.99, $R^2 = 0.048$ (0.044) (0.090) 5.09 10.92
DLR - DLA	DLR = 0.39*DLA, Errorvar.= 0.88, $R^2 = 0.15$ (0.044) 8.89
DLR = DLW + DLA	DLR = 0.60* DLW + 0.26*DLA, Errorvar.= 0.52, $R^2 = 0.50$ (0.051) (0.039) (0.056) 11.75 6.64 9.27

4. Discussion and Conclusion

As you see like high school student, the students who take distance learning course for a first time, their anxiety level is not very low. This finding reveals that there should be study for decreasing the anxiety level of learners in distance learning.

It is observed that the willingness of high school students towards to distance learning is near of the average but is lower than average. This situation may due to placement of students accepted in distance learning in university entrance exam system in Turkey with lower mark as well as the anxiety of these students related to distance learning. From this aspect, it is revealed that application is required for increasing the willingness of the students towards to distance learning. However; high school students' availability for distance learning, independent learning-control and motivation are higher than average. From these findings, that high school students' anxiety, willingness and readiness towards to distance learning are on average is understood.

When the availability of high school students' to distance learning, their anxiety is negative from but willingness is positive form. Therefore; high school students should be informed in a kind of decreasing anxiety towards distance learning for increasing the availability. In addition to that for increasing the willingness sample application and activity should be organized to students.

References

- Bender, D. M., Wood, B. J. & Vredevoogd, J. D. (2004): Teaching Time: Distance Education Versus Classroom Instruction, *American Journal of Distance Education*, 18:2, 103-114 To link to this article: http://dx.doi.org/10.1207/s15389286ajde1802_4
- Williams, A. S. (2010). Statistics anxiety and instructor immediacy. *Journal of Statistical Education*, 18, 1-18.
- Conrad, D. L. (2002): Engagement, Excitement, Anxiety, and Fear: Learners' Experiences of Starting an Online Course , *American Journal of Distance Education*, 16:4, 205-226 To link to this article: http://dx.doi.org/10.1207/S15389286AJDE1604_2.
- C.H.Aydin, "Açık ve Uzaktan Öğrenmede Kullanılan Basılı Materyallerdeki Anlatım Biçimine ilişkin Öğrenen Tercihleri", *Anadolu Üniversitesi Sosyal Bilimler Dergisi*, Cilt 5, Sayı 1, s.131-147, 2005.
- K. Selvi (2006). "Right of Education and Distance Learning", *Eurasian Journal of Educational Research*, 22, 201-211.
- Reeves, T. C., & Brackett, F. (1998). User characteristics checklist. http://mime1.gtri.gatech.edu/MM_Tools/UCC.html.
- ÖSYM Prefer Manual (2011). 2011-ÖSYS Higher Education Programs Prefer Manual. [online: <http://www.osym.gov.tr/belge/1-12895/2011-osys-yuksekokretim-programlari-tercih-rehberi.html>, date: 12.12.11].