Turkish Adaptation of the AI Readiness Scale for Preservice Teachers

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Abstract – This study aimed to adapt the scale created by Wang et al. (2023) into Turkish. The constructs developed by Karaca et al. (2021) were utilized for the constructs addressed in this study. Validity and reliability studies were conducted during the adaptation process. The original scale has a 5-point Likert structure. The scale has 18 items and 4 subscales. The aim of the scale is to examine the perception of pre-service teachers' readiness for the use of artificial intelligence in teaching. This research was conducted with preservice students studying at the faculty of education. All of the scale adaptation stages were followed in the study. In the analysis of the data, various analyzes were included for the validity and reliability studies of the scale. As a result of the research, a valid and reliable scale capable of determining the artificial intelligence readiness of preservice teachers with four subscales was introduced to the literature.

Keywords – artificial intelligence, artificial intelligence readiness, preservice teachers, scale adaption.

I. INTRODUCTION

Artificial intelligence is effective in many fields. One of these areas is education. For this reason, it has become important to determine the ability of stakeholders and users in the field of education to use artificial intelligence technology (Wang et al. 2023a). Therefore, it becomes essential to evaluate the readiness of teachers and prospective teachers to use artificial intelligence technologies. As a matter of fact, AI is developing day by day in learning environments as a powerful tool that supports teachers' work in improving and automating the feedback given to students, automatically monitoring the progress of learning, evaluating their performance and providing personalized support (Chounta et al., 2022; Wang et al. 2023a; Yildiz Durak & Onan, 2024).

Readiness in digital environments has been associated with increasing technology self-efficacy, taking control of their own learning and communication skills (Yildiz Durak, 2016, 2018). Measuring the level of readiness allows for guidance in accordance with the individual and characteristic features of the individual, examining the needs of the individual and making plans, programs and preparations in accordance with these needs (Karaca et al., 2021). In this context, pre-service teacher education plays a significant role especially for pre-service teachers to successfully integrate rapidly developing technologies into their classrooms in the future. The purpose of this study is to introduce the "AI Readiness Scale for Preservice Teachers" to the Turkish literature in order to measure the artificial intelligence readiness of preservice teachers.

II. MATERIALS AND METHOD

A. Research model and participants

The participants of this study were pre-service teachers studying in different departments of the faculty of education at two state universities in Turkey. The age range of the participants is between 18-25. It was determined that approximately 2/3 of the participants were female.

B. Data Collection Tools

In this study, data were collected using a personal information form and "AI Readiness Scale for Preservice Teachers". The data collection tool was applied to the students online.

In the first part, personal information form was used. In this form, questions about personal information such as gender and age were asked.

AI Readiness Scale for Preservice Teachers: This scale was developed by Wang et al. (2023) in the context of the structures in the study of Karaca et al. (2021). Within the scope of this study, adaptation into Turkish was conducted. The scale is a 5-point Likert scale. According to the rating scale, 1 is scored as strongly disagree and 5 is scored as strongly agree. This scale consists of 18 items and 4 sub-dimensions. The sub-dimensions are "cognition, ability, vision and ethics in teaching".

C. Data Set and Analysis

Data were collected through an electronic Google form containing Likert-type items. During the data collection process, the data collected through online forms were transferred to a

spreadsheet program. Construct validity and item analysis were conducted for the adaptation study of the scale. LISREL 8 and SPSS 24 software were used to analyze the data.

III. RESULTS

D. Descriptive findings

The mean, standard deviation, skewness and kurtosis values of the items of the Turkish adapted AI Readiness Scale for Preservice Teachers are presented in Table 1.

Table 1. Descriptive values of the items

	Mean	Std. Deviation	Skewness		Kurtosis	
			Statistic	Std. Error	Statistic	Std. Error
AIR1	3,65	0,997	-0,908	0,086	0,709	0,171
AIR2	3,63	0,945	-1,009	0,086	1,103	0,171
AIR3	3,71	0,957	-1,102	0,086	1,182	0,171
AIR4	3,54	1,004	-0,732	0,086	0,269	0,171
AIR5	3,83	0,985	-1,244	0,086	1,519	0,171
AIR6	3,61	0,972	-0,767	0,086	0,517	0,171
AIR7	3,55	0,998	-0,729	0,086	0,399	0,171
AIR8	3,59	0,971	-0,787	0,086	0,56	0,171
AIR9	3,7	0,974	-1,05	0,086	1,091	0,171
AIR10	3,63	0,987	-0,962	0,086	0,778	0,171
AIR11	3,66	0,973	-0,995	0,086	0,91	0,171
AIR12	3,75	0,96	-0,983	0,086	0,907	0,171
AIR13	3,43	1,031	-0,516	0,086	-0,15	0,171
AIR14	3,67	0,99	-1,021	0,086	0,875	0,171
AIR15	3,81	0,974	-1,197	0,086	1,457	0,171
AIR16	3,79	0,973	-1,195	0,086	1,385	0,171
AIR17	3,46	1,071	-0,495	0,086	-0,339	0,171
AIR18	3,68	1,024	-0,871	0,086	0,479	0,171

According to Table 1, the mean scores of the items ranged between 3.43 and 3.83, and the standard deviations ranged between 0.945 and 1.071. Skewness and kurtosis values were between +1.5 and -1.5. These findings related to skewness and kurtosis show that all items are normally distributed.

E. Confirmatory Factor Analysis

For the factorial validity of the AI Readiness Scale for Preservice Teachers, confirmatory factor analysis was used for the theoretical model consisting of 4 factors and 18 items. Since the fit indices were within the recommended range and all of the estimated factor loadings were below one, no item was removed from the scale.

The path diagram of the model obtained as a result of CFA to test the construct validity of the AI Readiness Scale for Preservice Teachers is presented in Figure 1. It shows the effect sizes

of the factors on the items as standardized coefficients. Standardized coefficients are parameters that show how much each item represents the latent variable to which it belongs and these values are expected to be below 1 (Şimşek, 2007).
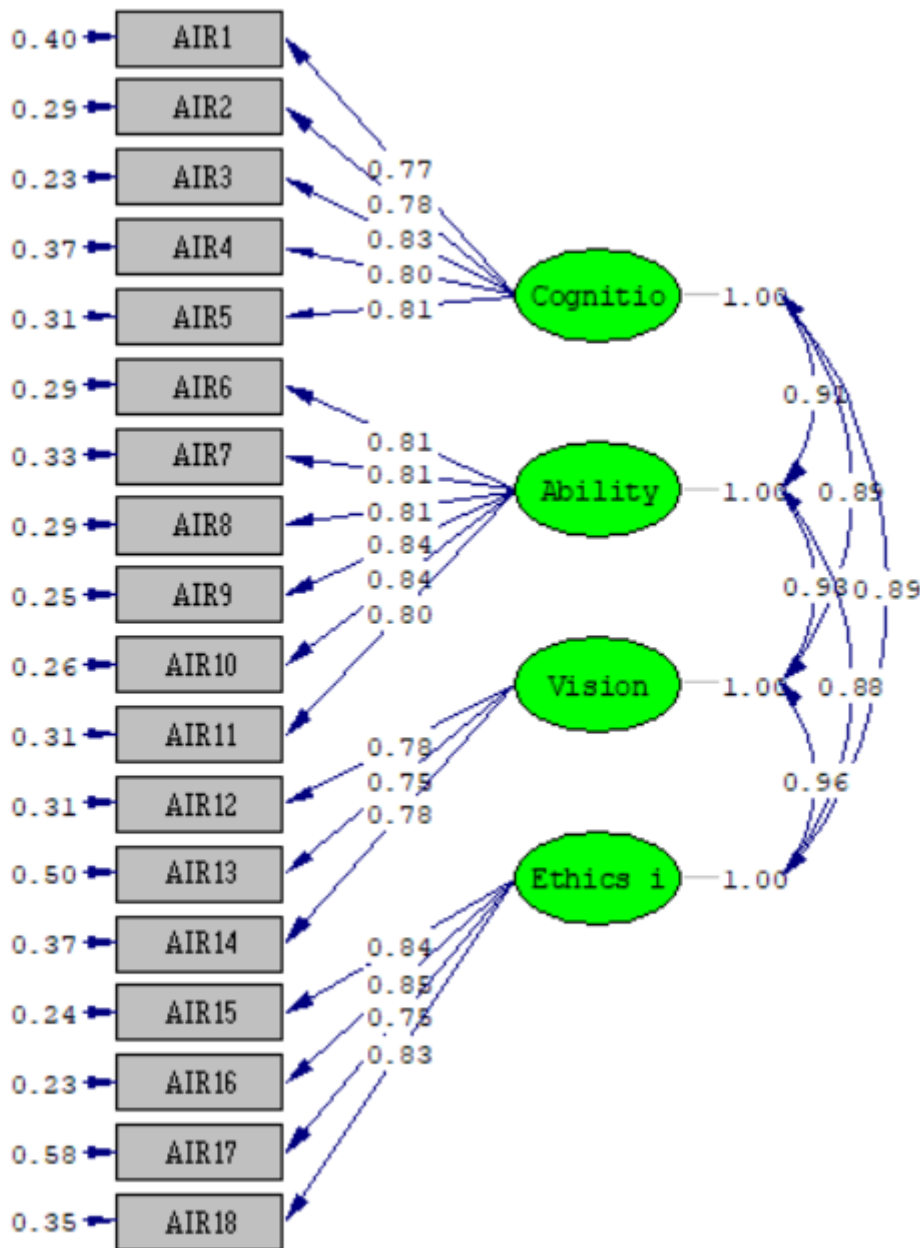

Figure 1. Path diagram for confirmatory factor analysis

According to Figure 1, the factor loadings are between 0.75 and 0.85. According to the CFA results, the fit between the model and the data is acceptable. In addition, the Root Mean Square Error of Approximation (RMSEA) value of 0.08 indicates that the model-data fit is acceptable (Şimşek, 2007). When the model-data fit indices are considered in general, it can be said that the model fits the data well and the scale has construct validity (Hu & Bentler 1999). As a result of the analysis, the fit indices were [$\chi2$=853.94, RMSEA=0.08, NFI=0.98, NNFI=0.98, CFI=0.99, IFI=0.99]. GFI, NFI, NNFI, CFI and IFI values above 0.95 (Hu & Bentler, 1999)

indicate perfect/acceptable fit. According to the t-test findings, all correlations were statistically significant. These findings indicate that there is sufficient evidence for validity.

Table 2. Internal consistency values

Subscales	Items	Cronbach α
Cognition	5	0.908
Ability	6	0.933
Vision	3	0.819
Ethics in teaching	4	0.884
Total	18	0.967

The Cronbach's alpha coefficients calculated for the subscales were 0.908 for the cognition subscale, 0.933 for the ability subscale, 0.819 for the vision subscale and 0.884 for the ethics in teaching subscale. These results show that the scale has internal consistency since these values are higher than 0.70.

IV. DISCUSSION

The aim of this study is to adapt the AI Readiness Scale for Preservice Teachers into Turkish. In this adaptation study, validity and reliability studies of the scale were conducted.

In the adapted scale, 5 items were used to represent the concept of cognition in the use of AI, 6 items were used to represent the ability to use AI for teaching, 3 items were used to represent the concept of vision in the use of AI for teaching, and 4 items were used to measure ethics in the educational use of AI. In the process of adapting the AI Readiness Scale for Preservice Teachers into Turkish, the opinions of language experts and then two field experts were taken.

Confirmatory factor analysis of the scale was conducted. For reliability, Cronbach's Alpha internal consistency coefficients were analyzed. No item was removed as a result of the adaptation study. As a result of the adaptation study, an 18-item 5-point Likert-type scale with 4 sub-dimensions was introduced to the literature.

V. CONCLUSION

As a result of this study, a Turkish scale adaptation study was conducted to measure the perception levels of readiness levels for the acceptance and sustainability of the use of artificial intelligence technologies. It can be said that the items in the adapted scale accurately measure the construct in question. Therefore, the scale adapted in this study can be used to determine the AI readiness levels of preservice teachers in different branches.

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Supplementary file

Appendix A. Items for AI-readiness scale for preservice teachers

Constructs		Items- ENG	Items- TR
AI-readiness	Cognition	(CO1) I clearly understand the new role of teachers in the era of AI. (CO2) I can effectively balance the relationship between teachers and AI technologies. (CO3) I understand how AI technologies are trained and function in education. (CO4) I can distinguish the functions and features of different AI tools and applications.	(CO1) Yapay zeka çağında öğretmenlerin yeni rolünü açıkça anlıyorum. (CO2) Öğretmenler ve yapay zeka teknolojileri arasındaki ilişkiyi etkili bir şekilde dengeleyebilirim. (CO3) Yapay zeka teknolojilerinin eğitimde nasıl eğitildiğini ve işlev gördüğünü anlıyorum. (CO4) Farklı yapay zeka araçlarının ve uygulamalarının işlevlerini ve özelliklerini ayırt edebilirim.

		(CO5) I understand the importance of utilizing AI technologies for data collection, analysis, evaluation, and security in education in the era of AI.	(CO5) Yapay zeka çağında eğitimde veri toplama, analiz, değerlendirme ve güvenlik için yapay zeka teknolojilerini kullanmanın önemini anlıyorum.
Ability		(AB1) I can effectively integrate AI technologies into my classroom routines.	(AB1) Yapay zeka teknolojilerini sınıf rutinlerime etkili bir şekilde entegre edebilirim.
		(AB2) I can design different teaching approaches based on different functions of AI technologies.	(AB2) Yapay zeka teknolojilerinin farklı işlevlerine dayalı olarak farklı öğretim yaklaşımları tasarlayabilirim.
		(AB3) I can rationally use AI technologies to solve problems discovered during the teaching process.	(AB3) Öğretim sürecinde keşfedilen sorunları çözmek için yapay zeka teknolojilerini rasyonel bir şekilde kullanabilirim.
		(AB4) Based on the visual and real-time feedback provided by AI technologies, I can improve my teaching in the next step.	(AB4) Yapay zeka teknolojilerinin sağladığı görsel ve gerçek zamanlı geri bildirimlere dayanarak bir sonraki adımda öğretimimi geliştirebilirim.
		(AB5) I can optimize and reorganize the teaching process with the help of AI technologies.	(AB5) Yapay zeka teknolojilerinin yardımıyla öğretim sürecini optimize edebilir ve yeniden düzenleyebilirim.
		(AB6) I can effectively discuss, share, and collaborate with other teachers on the use of AI technologies to jointly design high-quality teaching solutions.	(AB6) Yüksek kaliteli öğretim çözümlerini ortaklaşa tasarlamak için yapay zeka teknolojilerinin kullanımı konusunda diğer öğretmenlerle etkili bir şekilde tartışabilir, paylaşabilir ve işbirliği yapabilirim.
Vision		(VI1) I understand the strengths and limitations of AI technologies.	(VI1) Yapay zeka teknolojilerinin güçlü yönlerini ve sınırlılıklarını anlıyorum.
		(VI2) I have my own unique thinking and views on how to improve and use AI technologies for education.	(VI2) Yapay zeka teknolojilerinin eğitim için nasıl geliştirileceği ve kullanılacağı konusunda kendime özgü düşüncelerim ve görüşlerim var.
		(VI3) I foresee the opportunities and challenges that AI technologies entail for education.	(VI3) Yapay zeka teknolojilerinin eğitim için sunduğu fırsatları ve zorlukları öngörüyorum.
Ethics		(ET1) I understand the digital ethics that teachers should possess in the era of AI.	(ET1) Yapay zeka çağında öğretmenlerin sahip olması gereken dijital etiği anlıyorum.

(ET2) I understand the ethical obligations and responsibilities teachers need to assume in the process of using AI technologies.	(ET2) Öğretmenlerin yapay zeka teknolojilerini kullanma sürecinde üstlenmeleri gereken etik yükümlülükleri ve sorumlulukları anlıyorum.
(ET3) I know how to keep personal information safe when using AI technologies.	(ET3) Yapay zeka teknolojilerini kullanırken kişisel bilgileri nasıl güvende tutacağımı biliyorum.
(ET4) I use the data of teachers and students generated by AI systems following legal and ethical norms.	(ET4) Yapay zeka sistemleri tarafından üretilen öğretmen ve öğrenci verilerini yasal ve etik normlara uygun olarak kullanacağımı bilirim.