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## Teachers' Perception Scale Towards the Use of Artificial Intelligence Tools in Education

Seher IŞIK\*

*Amasya University, Graduate School of Science, Department of Computer Education and Instructional Technology, Amasya University, Amasya, Türkiye*  
ORCID: 0009-0002-0828-4063

Recep ÇAKIR

*Amasya University, Faculty of Education, Department of Computer Education and Instructional Technology, Amasya, Türkiye*  
ORCID: 0000-0002-2641-5007

Özgen KORKMAZ

*Amasya University, Department of Computer Engineering, Amasya, Türkiye*  
ORCID: 0000-0003-4359-5692

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The aim of this study is to develop a scale to determine teachers' perceptions of the use of artificial intelligence tools in education. The universe of the study consists of teachers from different branches working in schools affiliated with the Ministry of National Education throughout Türkiye in the 2023-2024 academic year. The sample of the study consists of 530 volunteer teachers. Exploratory factor analysis was conducted to determine the construct validity of the scale with the collected data. Pearson r test was used for the validity of the scale, and in order to determine the discrimination of the items, the difference between the groups was examined by determining the 27% upper group and 27% lower group. In order to obtain reliability, internal consistency coefficients were calculated, and stability tests were conducted with the test-retest method. The scale consists of 3 factors and 37 items. The factors were named considering the item contents. The total Cronbach Alpha value of the factors in the scale was determined as 0.970 and the total Omega value as 0.971. The correlation obtained by the test-retest method varies between 0.660 and 0.509 of the factors. It was determined that the factors determined in the scale explained 64.295% of the total variance. In this study, the validity and reliability of the "Teachers' Perception Scale towards Use of Artificial Intelligence Tools in Education" was evaluated. The results of the research show that the scale is a valid and reliable measurement tool in determining teachers' perceptions about the use of artificial intelligence tools in education.

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## Introduction

From the 1900s to the present day, it is seen that technology has progressed rapidly and has been in constant development. It can be said that this developing technology has made

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\* Correspondency: [isikshr993@gmail.com](mailto:isikshr993@gmail.com)

human life easier by incorporating it into many sectors. The rapid advancement of technology in the 21st century reveals artificial intelligence-based technology tools. Today's artificial intelligence tools are increasingly utilized in various fields, including health, education, and defense. One of the areas where artificial intelligence is widely used is the field of education. With the emergence of artificial intelligence technologies, their applications in education are surprisingly increasing (Asmar, 2022). With the development of information processing and information processing techniques, artificial intelligence has been widely applied in education (Ouyang & Jiao 2021). However, it appears that significant progress has been made in the research and design of Artificial Intelligence-based educational technologies. It is stated that the main purpose of using artificial intelligence in education is to develop learning experiences effectively and efficiently (Timms, 2016). With these important developments, the use of artificial intelligence tools in education also affects the learning and teaching process. Artificial intelligence in education offers powerful pedagogical tools that can improve the quality of teaching (Terzi, 2020). Teaching materials used by students with artificial intelligence technologies; It is possible to avoid the traditional method from the traditional method by customizing the skills, habits, and learning styles for each situation and allow the individual to make more accurate progress in analysis, conclusions and correct steps with a unique educational structure (Uzun et al., 2021). The different roles and the usage of artificial intelligence in existing theories have impact on learning and teaching environment (Hwang et al., 2020). To use AI in an educational and meaningful way, teachers need to learn new digital skills, learn to examine the process and create sustainable solutions in real-world environments (Pedro et al., 2019). The teaching and learning system can be revolutionary with the application of artificial intelligence technology (Ahmed, 2020). In this context, through teaching and learning experiences and adaptive learning algorithms, educators can meet various learning needs and facilitate understanding and retention of concepts.

When the literature is examined, it appears there are various studies on artificial intelligence in education. Based on the connection between artificial intelligence and human intelligence, Coşkun & Gülleroğlu (2021) aimed to determine how advanced artificial intelligence is, whether it poses a threat or superiority to humans, and what effects it may have on education. The study also stated that artificial intelligence systems provide positive guarantees in this context. It has also been determined that artificial intelligence will bring change to humanity and contribute to its development as long as it is used for the right purposes. In his study to determine the changes in higher education in the age of artificial intelligence, Ma (2019) stated that artificial intelligence will have a truly transformative effect with constant restructuring and curriculum changes. İşler & Kılıç (2021) aimed to determine the possible contributions of artificial intelligence to the education sector. As a result of his study on the usability of chatbots as a student support system in the distance education process, Kayabaş (2010) concluded that the satisfaction level of the learners towards Cabbar support, one of the artificial intelligence tools and chatbots, was slightly below the average. Chen et al., (2020) conducted a systematic study on artificial intelligence and emphasized that while artificial intelligence technologies are widely adopted in educational contexts, they are rarely adopted in more advanced techniques. As a result of their research to learn the thoughts of teacher candidates about artificial intelligence tools, Çam et al. (2021) concluded that teacher candidates are aware of artificial intelligence technology. Chen et al., (2020) concluded in their study on the rise of artificial intelligence in education that by using artificial intelligence, instructors can perform different administrative functions and be productive in teaching activities such as reviewing and grading students' homework more effectively and efficiently and achieving higher success. Based on this, it is possible to say that teachers' use of artificial intelligence tools in education not only provides them with convenience but also contributes to their competence in this field. The

artificial intelligence technologies allow for the development of creative skills (Jarrahi, 2018). It can reduce the workload of teachers and also help guide data analysis in educational institutions (Feyzi et al., 2023). Human-computer interactive technology enabled by artificial intelligence can benefit teachers and students to answer their questions online (Goel et al., 2018). Artificial, in addition intelligence technology can help teachers improve their skills teachers provide personalized and precise teaching guidance to students (Murphy, 2019). Teachers' attitudes and perceptions towards the use of artificial intelligence technology have a significant impact on education. The effective application of artificial intelligence tools in learning environments, the usefulness and ease of application of artificial intelligence tools for teachers, their compatibility with learning methods, as well as factors related to behavioral issues are factors that affect perceptions. In this context, teachers' perceptions of artificial intelligence tools may be an important determinant of how technology will be used in education.

Perception seems to be a conceptual term with different definitions, especially in fields such as psychology, philosophy and literature. Perception is considered the primary source of knowledge (Moustakas, 1994). The value of studying people's thoughts, feelings, or beliefs is that it can shed light on what actions people will take in situations that affect them (Al, 2012). When the literature is examined, it is observed that there exist many studies on perception. As a result of his studies, Bandura (1997) stated that perception self-efficacy plays an important role in helping people achieve their goals and intentions and is an individual's evaluation of his ability to successfully organize and carry out the activities required to exhibit a certain performance.

Teachers' perceptions of artificial intelligence-based educational technologies may affect their integration into educational processes. Identifying and addressing teachers' perceptions of technology and how technology can be used to improve teaching and learning is critical to encouraging engagement (Buabeng, 2012). Teachers with positive perceptions may think that artificial intelligence-based tools can contribute to learning processes and encourage the use of these technologies in the classroom. Teachers with negative perceptions may think that artificial intelligence-based educational technologies may reduce student-teacher interaction or negatively affect students' learning experiences. A number of studies on artificial intelligence concerns and artificial intelligence literacy seem to have accumulated in the line of literature. (Kolcu et al., 2021) adapted the study titled "Evaluation of the Validity and Reliability of the Artificial Intelligence Anxiety Scale in Family Physicians" by using the guide written by (Sousa & Rojjanasrirat, 2011) on scales and measurement tools related to the field of health. (Laupichler et al., 2023) have argued that by adapting the "Artificial Intelligence Literacy Scale" they developed in Turkish culture, the scale will make significant contributions to the assessment of artificial intelligence literacy. The "Artificial Intelligence Anxiety Scale" developed by (Wang et al., 2019) will reduce anxiety about artificial intelligence development. (Akkaya et al., 2021) adapted the scale developed to develop a general tool to measure and determine the relationships between artificial intelligence and motivated learning behavior in individuals into Turkish. "Artificial Intelligence Literacy Scale" developed by (Wang et al., 2023), (Çelebi et al. 2023) examined its validity and reliability and adapted it to Turkish. They emphasized that the scale is important in determining concerns about artificial intelligence and will make a significant contribution to future studies in this field. This study aimed to develop a perception scale of teachers regarding the use of artificial intelligence tools in education. Although the studies in the literature are generally on the perception of artificial intelligence, this study differs from other studies in that it focuses on the use of artificial intelligence tools. For this reason, conducting this study is the continued use of artificial intelligence in education and teachers' perception of technology that can directly affect the use



of artificial intelligence. Therefore, it is important to understand teachers' perceptions of artificial intelligence tools and the factors that contribute to their thinking about increasing the use of artificial intelligence in education. In addition, determining teachers' concerns, expectations and obstacles regarding the use of artificial intelligence tools in education can ensure that these tools can be integrated into education effectively and efficiently. In this context, it is thought that the scale to be developed can make a significant contribution to the literature and future studies on this field.

## **Method**

### ***Research Design***

Descriptive studies are the types of research in which an event, situation or group is tried to be explained by considering the opinions and attitudes of individuals in a group regarding facts and events. The research design of this study is also based on the descriptive survey model. Three basic steps were followed in this process. In the first step, the studies in the literature on the use of artificial intelligence tools in education were examined and the frequency of occurrence of the topics covered was investigated. Then, these topics were grouped by taking an expert opinion and gathered under general and specific (sub) headings. The opinions of six experts on each heading and related questions were collected through electronic forms (Google Forms), and final arrangements were made in line with the feedback received. Consequently, within the scope of the research topic, a comparative evaluation of the literature-based framework was made with the answers given by the participant group to the created forms.

### ***Research Group***

The universe of the study consists of teachers from different branches working in different schools affiliated with the Ministry of National Education and throughout Turkey during the 2023-2024 academic year. For this purpose, participants from different branches were included in the study. The appropriate sampling method contributed to the rapid progress of the study by including an easily accessible group of participants. In this way, the research was carried out with a diverse and suitable sample group that could represent the entire research group. The participants consisted of 530 teachers who volunteered among teachers from different disciplines. Accordingly, the sample size must be at least five or even 10 times the number of variables, that is, the number of items. Therefore, the number of study groups in this research is sufficient (Tavşancıl, 2010). The study included 211 Information Technologies Teachers, 93 English Teachers, 64 Classroom Teachers, 49 Science Teachers, 34 Music Teachers, 32 Religious Culture and Ethics Teachers, 17 Turkish Language Teachers, 16 History Teachers, 4 Visual Arts Teachers, 4 Geography Teachers, 6 A Special Education Teacher participated. However, the data obtained from 26 teachers were not included in the dataset as normal distribution was ignored and the analysis continued with 504 data. However, since the data obtained from 26 teachers disregarded the normal distribution in the analysis, they were removed from the data set and the analysis continued with 504 data. Demographic information about the teachers is summarized in Table 1.

**Table 1:** Frequency and Percentage of Demographic Characteristics of the Teachers Constituting the Working Group Distribution

Variables		Frequency (f)	Percentage (%)
Gender	Male	274	54.4
	Woman	230	45.6
	Total	504	100
Vocational Experience	0-5 Years	195	38.7
	6-10 Years	164	32.5
	11-15 Years	82	16.3
	20 Years and above	64	12.5
	Total	504	100
Education Level	Bachelor's degree	443	87.9
	Master	60	11.9
	Phd	1	0.2
	Total	504	100

When Table 1 is examined, it has been seen that the number of male teachers is higher and the percentage distribution is close to each other. The research group is evaluated according to the teachers' experiences, and it is clear that the majority of teachers have experience between 0-5 years, while a small number of teachers have experience of 20 years or more. Considering the education level of the participants, it is seen that the majority of them have a bachelor's degree.

### **Item Pool Development Process**

Within the scope of the research, before creating the draft scale items, a comprehensive literature review was conducted and similar scale development studies such as artificial intelligence and technology use were examined. Among these studies, the items used and the adapted items from the scales “Adaptation of Artificial Intelligence Literacy Scale to Turkish” by Polatgil and Güler (2023), “Acceptance and Attitudes of Students Towards the Use of Virtual Reality Headsets and Virtual Reality Glasses for Educational Purposes” by Ergül and Taşar (2023), and “Students' Acceptance and Attitudes Towards the Use of Virtual Reality Headsets and Virtual Reality Glasses for Educational Purposes” by Ustun (2023) are presented in Table 2.

**Table 2.** Some examples of the items used from the mentioned scales

Adapted Items
I can use artificial intelligence applications or products to increase my work efficiency.
I closely follow new digital technologies that support student learning.
I can create learning environments suitable for students' individual differences by using digital technologies.
I can enable students to evaluate their own learning processes using digital technologies (educational software, virtual classrooms, etc.).
I can use digital technologies to ensure active participation of students in the lesson.
Using virtual reality increases my productivity.
Virtual reality is useful for everyday life.
Using virtual reality allows me to complete my work faster.

The scale is in 5-point scale type. The draft scale consisted of 61 questions in total. It was submitted to the opinions of 6 academicians specialised in the field of computer teaching and technologies. In the draft form sent, experts were asked to evaluate each item using the options "appropriate, should be removed and corrected", and when they selected the options "must be removed and corrected", they were asked to add their opinions and suggestions to the "explanation" section to make the necessary updates for the items. The items were re-written in line with the first expert opinions received. by evaluating necessary corrections have been made. from scale removal suggested materials removed, change to be done required materials Updated according to suggestions. After the corrections were made, 17 items were removed and submitted to expert opinions again. As a result of the second opinion received from the experts, the necessary updates were made again, and four more items were removed, and a 40-item scale was obtained.

### ***Analysis of Data***

In order to analyze the construct validity of the scale, factor analysis was first conducted with KMO and Bartlett tests. Explanatory factor analysis was conducted on the resulting data. The principal component analysis method was used to determine the factors that could form the scale. The loadings of the obtained factors were examined by performing the varimax orthogonal rotation test. This method can make the relationship between the items clearer and interpret able by identifying items that have a high similarity relationship with the factors, thus allowing the results to be presented better. It detects items that are highly similar to the factors themselves and provides a simpler interpretation of the items. (Bryman and Cramer, 1997; Büyüköztürk, 2002; Turgut & Baykul, 1992). It is acceptable for the factor loading values of the items to be above .40; however, items with low factor loading values can be removed from the scale if they are not deemed important. Moreover, items with slightly lower factor loading values that are considered important may be used in the scale based on expert opinions. Items with factor loadings below .40 were removed from the scale and the analysis was repeated. After the relevant factors were removed, the item discrimination and item-total correlations of the remaining 37 items were determined using Pearson's r-test to determine the validity of the scale. To determine the reliability of the scale, internal consistency coefficients were calculated, and stability tests were performed using the test-retest method. Cronbach-Alpha reliability coefficient and Omega formula were used for internal consistency level. In order to determine the stability level of the scale, the correlation between the results of two applications performed two weeks apart was calculated.

## **Results**

### ***Findings Regarding the Validity of the Scale***

#### ***Construct Validity***

An exploratory factor analysis, a KMO coefficient and a Bartlett sphericity test were carried out on all the data collected from the 40 items. It was seen that the KMO value of the data was 0.976 and the Bartlett test value was  $\chi^2 = 20805.129$   $df = 780$  ( $p = 0.000$ ). If the KMO value is greater than 0.60, the Bartlett test gives significant results and indicates that the data is sufficient for factor analysis (Büyüköztürk, 2002). As a result of the analysis, it is seen that the remaining 37 items are divided into three factors. In the last case, the KMO value of the scale consisting of 37 items was 0.975 and the Barlett test value was  $\chi^2 = 18273.619$ ; It was observed

that  $df = 780$  ( $p = 0.000$ ). of data factor analysis for Its suitability is shown in Table 3.

**Table 3.** Examination of Data Suitability for Factor Analysis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy .		.973
	Approx . Chi-Square	18273.619
Bartlett's Test of Sphericity	df	780
	Sig .	.000

The exploratory factor analysis, which showed in the Figure 1 divided items into three factors, with the first factor consisting of 22 items, the second factor consisting of eight items, and the third factor consisting of seven items.

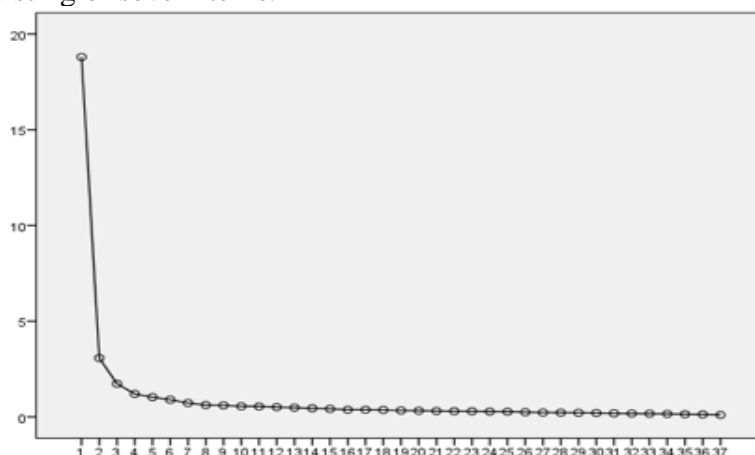


Figure 1. Scree plot

The factor loadings and factor names, eigenvalues and variance ratios of the scale items are shown in Table 4.

**Table 4.** Factor loadings of the scale items

Items		Competence	Anxiety	Usefulness
I18	I can use artificial intelligence tools easily.	.844		
I2	I can identify appropriate AI tools to evaluate students' performance.	.832		
I26	I have sufficient knowledge and skills in the use of artificial intelligence tools.	.828		
I12	I can design efficient learning environments using artificial intelligence tools.	.827		
I24	I have the necessary knowledge and skills to integrate artificial intelligence tools into my future courses.	.826		
I1	I can prepare course content using artificial intelligence tools.	.826		
I5	For each achievement, I can decide which artificial intelligence tool can be used more effectively.	.811		
I33	I know how to get support from artificial intelligence tools to solve any problem I encounter.	.805		
I14	I am careful to use artificial intelligence tools in a way that ensures active participation of students in the lesson.	.731		
I39	I am ready to produce teaching materials using artificial intelligence tools.	.730		

I9	I follow artificial intelligence tools that will contribute to my professional development.	.729		
I3	I get support from artificial intelligence tools to carry out in-class activities.	.724		
I4	I follow the developments regarding artificial intelligence tools closely.	.717		
I13	I consider the relevant learning outcomes when choosing the artificial intelligence tools I will use.	.715		
I8	I can access information faster with artificial intelligence tools.	.601		
I19	I get support from artificial intelligence tools to solve a problem I encounter in daily life.	.571		
I38	I am willing to prepare teaching materials using artificial intelligence tools.	.560		
I16	I attend seminars and events about new artificial intelligence tools to improve myself.	.555		
I35	I believe that it is necessary to use artificial intelligence tools for the courses I will teach.	.555		
I32	Artificial intelligence tools save time in completing my work.	.537		
I28	I think artificial intelligence tools will save time.	.521		
I6	I think artificial intelligence tools are important for education.	.478		
I20	The use of artificial intelligence tools in education negatively affects students' attitudes towards the lesson.		.790	
I17	The use of artificial intelligence tools in education negatively affects students' academic success.		.780	
I37	I think artificial intelligence tools will reduce the quality of the education I provide.		.772	
I23	The use of artificial intelligence tools in education can make the learning process boring.		.703	
I7	The use of artificial intelligence tools in education concerns me.		.675	
I36	I think artificial intelligence tools are not suitable for me.		.605	
I40	I do not use artificial intelligence tools unless necessary.		.592	
I25	I think that the use of artificial intelligence tools in education will increase the success of students.		.502	
I34	I think that evaluations made with artificial intelligence tools will provide more accurate information about students' learning processes.			.768
I31	Artificial intelligence tools are useful for daily life.		.695	
I11	I use artificial intelligence tools to guide students.		.642	
I15	I enable students to evaluate their own learning processes using artificial intelligence tools.		.626	
I30	The use of artificial intelligence tools increases my chances of solving the problems I encounter.		.624	
I29	The use of artificial intelligence tools increases my productivity.		.520	
I21	Artificial intelligence tools can make students addicted to technology.		.304	
Eigenvalue (%)		12.735	5.585	5.469
Variance Explained (%)		34.418	15.095	14.782
Cumulative Variance (%)		34.418	49.513	64.295

As a result of the analysis, items I10, I22, I27 were removed from the analysis because their factor loadings were distributed over more than one factor. The remaining items have been renumbered. After three items were removed from the scale, it was seen that the remaining 37 items were divided into three factors. According to the results, the item load values of the first



factor between .478 and .844, for the second factor between .502 and .790, and finally for the last factor item load between .304 and .695. The total variance is seen as 64.295.

Considering that the items in the first factor are related to knowledge, skills, and practice, this factor is named "Competence. The competence factor has item load values between 478 and .844. It consists of 22 items in total. The explained variance ratio of the competence factor is 34.418. The items of the second factor were found to be related to negative effects (academic success), being boring, and worrying, and were named "Anxiety". The item load values of the anxiety factor are between .502 and .790 and consist of 8 items. The explained variance ratio of the anxiety factor is 15.095. The third factor of the items found to be more useful, with expressions such as providing guidance, solving problems, and productivity, was named "Usefulness". The item load values of the "Usefulness" factor were found to be .304. It was observed that it was between .695 and .695, and the explained variance ratio was 14.782. After the names were determined, they were presented to expert opinion. As a result of the expert opinions received, it was approved by the experts that the names given were suitable for the factors. After the names of the factors were determined, they were presented to expert opinion. Thus, as a result of the expert views received for the scale, the names given were approved by the experts to be suitable for the factors. When the eigenvalues of the items are examined, it is seen that the scale is grouped under 3 factors. It is seen that the eigenvalue (%) of factor 1 is 12.735, the eigenvalue (%) of factor 2 is 5.585 and the eigenvalue (%) of factor 3 is 5.469.

### Item Factor Total Correlations

Using the item-total correlation method, the correlation between the item score and the scores of the factors was calculated and the degree to which it served the purpose was found. Table 5 presents the Item-Total correlation analysis results.

**Table 5.** Item-Total correlation Analysis

Competence		Anxiety		Usefulness	
I. No	r	I. No	r	I. No	r
1	.865**	23	.781**	31	.842**
2	.721**	24	.650**	32	.645**
3	.776**	25	.551**	33	.668**
4	.769**	26	.557**	34	.637**
5	.805**	27	.533**	35	.676**
6	.744**	28	.398**	36	.611**
7	.707**	29	.459**	37	.091**
8	.790**	30	.448**		
9	.692**				
10	.729**				
11	.711**				
12	.650**				
13	.692**				
14	.664**				
15	.575**				
16	.636**				
17	.587**				
18	.575**				
19	.609**				
20	.584**				
21	.576**				
22	.511**				

N=504; \*\*=p<.001



That the correlation coefficients of the items in Table 5 vary between 0.511 and 0.865 for the first factor, Competence, 0.398 and 0.781 for the second factor, Anxiety, and 0.091 and 0.842 for the third factor, Usefulness. When we look at the whole scale, a significant and positive relationship between this and each item is obvious. ( $p < 0.01$ ). In this context, factor correlation values of the items show that each item in the scale serves its purpose.

### *Distinctiveness levels*

Independent samples t-test was used to determine the discrimination of the items. Independent samples t-test, 27% of the upper (high) group and 27% of the lower (low) group were determined and the differences between the groups were evaluated and summarized in Tablo 6.

**Table 6.** Items' Distinctiveness Levels

Competence		Anxiety		Usefulness	
I. No.	t	I. No.	t	I. No.	t
1	22.800	23	10.052	31	16.595
2	21.914	24	10.785	32	16.985
3	15.181	25	9.625	33	20.693
4	24.005	26	9.958	34	16.985
5	24.827	27	10.402	35	20.331
6	20.425	28	8.677	36	18.336
7	22.631	29	15.185	37	2.695
8	25.510	30	15.994		
9	19.709				
10	21.783				
11	28.530				
12	21.785				
13	27.001				
14	18.258		F1		35.744
15	13.453		F2		18.852
16	21.768		F3		25.112
17	18.585				
18	20.827		Total		37.857
19	20.815				
20	16.781				
21	15.181				
22	16.642				

n: 504; df : 275; p<001

Table 6 indicates that the factors of the scale, which has 37 items, and the values obtained as a result of the total independent sample t-test of these factors are between 2.695 and 28.530. It was concluded that the t-value of the entire scale was 37.857. The results obtained were found to be significant. ( $p < 0.001$ ). Therefore, it can be said that discrimination is high for each item on the scale.

### *Findings Regarding the Reliability of the Scale*

Internal consistency and stability analyses were conducted on the data to determine the reliability of the scale. The findings obtained as a result of the analyses are stated below:

### Internal Consistency

As a result of the analysis, the reliability analysis of the remaining 37 items and three factors of the scale according to factors was analyzed using Omega values and Cronbach Alpha reliability formula. The obtained factors and reliability analysis results for the entire scale are shown in Table 7.

**Table 7.** Reliability Analysis Results for the Overall Scale and Its Factors

Factors	Number of Items	Omega	CronbachAlpha
F1: Competence	22	0.973	0.972
F2: Anxiety	8	0.866	0.867
F3: Usefulness	7	0.874	0.854
Total	37	0.971	0.970

The Omega reliability coefficients in the first, second and third factors of the scale consisting of 37 items and 3 factors are 0.874 to 0.973; Cronbach Alpha reliability The coefficients vary between 0.854 and 0.972. The Omega value in the total factors in the scale is 0.971; and the Cronbach Alpha value is 0.970. According to the results obtained from the analysis, the internal consistency of the factors can be said that the coefficients are at a good level. The Cronbach Alpha value of 0.70 and above is considered sufficient in terms of reliability (Büyüköztürk, 2002).

### Test – Retest Reliability

Whether the collected data changed over time was examined using the Test-retest method. The relationship between measurement parameters and methods provides information about the stability and reliability of the measurement tool. Reliability is related to the consistency, sensitivity and stability of the relevant scale. Therefore, these values, called stability coefficients, are accepted as evidence that the scale is reliable (Hovardaoğlu, 2000) . In this context, data was collected again by applying the 37-item scale form to 20 teachers at 2-week intervals. Correlations between outcome scores obtained from the collected data were analyzed at the factor level. The results of the analysis are shown in Table 8.

**Table 8.** Test – Retest Reliability Results

Second Application		F1	F2	F3	Total
First Application	F1	.660**			
	F2		.649**		
	F3			.509**	
	Total				.599**

n: 20; \*\*=p<0.001

The correlation obtained using the test-retest method shows that the factors vary between 0.660 and 0.509. It was observed that the total of the factors was 0.599. In this context, there appears to be a significant relationship between the factors (p <0.001).

### Discussion

In this study, a scale was developed that aims to determine teachers' perceptions of the use of artificial intelligence tools in education. Teachers' Perception Scale on the Use of Artificial Intelligence Tools in Education is in the form of a 5-point Likert and consists of 37 items. The first factor consisting of 22 items is "Competence", the second factor consisting of



eight items is "Anxiety", and the third factor is "Usefulness" consisting of seven items. While naming the "Competence" factor of the scale, the items in the relevant factor were examined in detail and it was determined that they were related to knowledge, skills and application. This factor aims to measure teachers' skills and knowledge in using artificial intelligence tools effectively in teaching. It is about how well teachers understand and use these methods and how they can integrate these materials into their lessons. While naming the "Anxiety" factor of the scale, the relevant items of the factor were examined in detail, as was done in the first factor, and it was determined that the items were related to negative effects (academic success), boredom, and worry. This factor aims to measure the level of stress and anxiety created by teachers regarding the use of artificial intelligence tools. It focuses on situations where these tools may negatively impact teacher success, be difficult or uncomfortable to use, and generally cause teacher anxiety. While naming the "Usefulness" factor, as a result of examining the items in the factor, it was determined that there were expressions such as useful, guiding, solving problems and productivity. This factor aims to measure teachers' perceptions of the benefits of artificial intelligence tools in education. It focuses on the practical benefits of the tools for teachers, their role in teaching, and their role in increasing teacher productivity. While naming the factors in the scale, the items of similar scales in the literature were reviewed. The relevant factors found in Polatgil and Güler's (2023) study titled "Adaptation of the Artificial Intelligence Literacy Scale to Turkish" were named "Awareness, Use, Evaluation and Ethics", and the items in the scale were distributed equally to each factor. Kaya et al. (2022) investigated the impact of personality traits, artificial intelligence anxiety, and demographic factors on attitudes toward artificial intelligence using the "General Attitude Scale towards Artificial Intelligence" (GAAIS), which they adapted into Turkish. This scale was designed to explore teachers' perceptions of artificial intelligence tools in education. Similarly, Üzüm et al. (2024) developed the "Teachers' Perception Scale on the Use of Artificial Intelligence in Education" and the "Perception Scale on Teachers' Use of Artificial Intelligence Tools in Education," which share comparable objectives and focus with the GAAIS." Ferikoğlu and Akgün (2022) named the factors in the scale they developed for examining teachers' artificial intelligence awareness as "Practical Knowledge", "Belief-Attitude" and "Theoretical Knowledge" within the scope of association ability. In addition, in a similar study by Karaoğlan & Yılmaz (2023), it was seen that the factors were named "Technical understanding, Critical evaluation and Practical Application" in their scale study titled Adaptation of the Artificial Intelligence Literacy Scale into Turkish. There was no factor concerning the usefulness provided by artificial intelligence in the specified scales. In this scale study, there is a factor related to the benefits provided by artificial intelligence tools. In order to determine the validity of the scale, its distinctiveness was examined with factor analysis. According to the results obtained from the exploratory factor analysis, it was determined that the scale was divided into three factors. To determine the construct validity, the factor loadings, eigenvalues and explained variances of the items in the factors were examined, and the construct validity was found to be appropriate. To determine the level of purposefulness of the items in the scale, the total correlation method was applied to the items under each factor. Determining the relationship between the scores obtained from the items and the scores in the factor in which the items are located is used as a criterion to understand to what extent the content of each item in the scale serves the purpose of the factor in which it is located (Balci, 2009). In this context, it can be said that the factors and the items under the factors of the analysis result provide a service at a level appropriate to the purpose of measuring the feature specified by the scale as a whole. To determine the distinctiveness between the items, the differences between the groups were evaluated by creating an upper 27% group and a lower 27% group. According to the independent t-test results, it can be said that the discrimination of each item of the scale is quite high. The internal consistency level of the scale was determined by the Cronbach-Alpha reliability coefficient and Omega reliability

formula. When the analysis results are examined, it is seen that the internal consistency coefficients of the factors are high, and the scale is reliable. In order to determine whether the data obtained from the items in the scale changed over time, a test-retest process was carried out by using them again after a two-week break. As a result of the analysis, it can be said that the stability level of the scale is high. Since the data were collected at one time, CFA (Confirmatory Factor Analysis) analysis was not performed. Therefore, this is seen as a limitation of the study.

As a result, the “Teachers' Perception Scale on the towards of Artificial Intelligence Tools in Education” is expected to guide the literature and other studies as a valid and reliable measurement tool that can be used to measure teachers' perceptions of the use of artificial intelligence tools in education. In order for teachers to use AI tools effectively, AI technologies can be integrated into teacher training programs. These programs will not only teach teachers how to use AI tools but also help them incorporate these tools into their lessons seamlessly. Regular feedback from teachers and students can be collected to evaluate the impact of AI tools in education. This feedback will provide valuable insights into how the use of AI tools can be improved and identify areas where further development is needed. Moreover, extensive research projects can be conducted to explore the effects of AI tools in education. These projects can aim to assess perceptions of AI tools, their impact on students' academic success, and teachers' competence in using them. In these aspects, the scale developed in this study is shown to be a useful tool for measuring teachers' perceptions of using AI tools in education. It is believed that this scale contributes significantly to the literature in this context, and its use in future research is recommended.

### **Conflict of Interest**

There are no conflicts of interest regarding the publication of this article.

### **Informed Consent**

Participants were informed about the study's objectives, procedures, and potential risks. They were informed that participation was voluntary and that they could withdraw from the study at any point if they felt reluctant without any consequences. All personal information was anonymized to protect participants' confidentiality.

### **Data Availability**

The data are not publicly available due to privacy or ethical restrictions.

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