

*Full Length Research Paper*

# **Pedagogical literacy scale: A scale development study**

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**The present study aims to develop a valid and reliable pedagogical literacy scale based on teachers' views. It also aims to investigate the variations in pedagogical literacy levels of teachers based on gender, educational level, and professional seniority variables to test the functionality of the pedagogical literacy scale. The study was conducted with teachers employed in educational institutions at various levels in Malatya Province, Turkey. The exploratory factor analysis was conducted with 345 active teachers employed in Yeşilyurt District in Malatya Province during the 2021-2022 academic year. Dynamic factor analysis (DFA) was conducted with 375 active teachers employed in Battalgazi District in Malatya Province during the 2021-2022 academic years, and the functionality of the scale was determined with 412 teachers employed in various districts in Malatya Province. In the study, the draft item pool included 37 items before the exploratory factor analysis. However, the experts suggested revision of three items and removal of four items, and the exploratory factor analysis (EFA) was conducted on 33 items. EFA results revealed that the scale included 4 factors in 25 total items. Confirmatory factor analysis (CFA) revealed that the 4-factor 25-item scale was acceptable based on excellent fit indices. The Cronbach Alpha coefficient of the scale that included 25 items and four factors was 901. The analysis was conducted to test the functionality of the scale and it was determined that the pedagogical literacy levels of the teachers were good. Furthermore, it was concluded that there were significant differences between the pedagogical literacy levels of the teachers based on gender, educational level and professional seniority variables.**

**Key words:** Pedagogy, literacy, pedagogical literacy, pedagogical literacy scale.

## **INTRODUCTION**

The concept of pedagogy, which is significant for educational variables, has been described in various studies. Based on these descriptions, it could be suggested that the main aim of pedagogy is to generate permanent and significant behavioral changes through quality learning in educational environments. The term pedagogy is originally a Greek word meaning "that entertains and distracts the child" (Koçođlu, 2021). Currently, it is associated with all educational activities

(Kanad, 1997; Karakuş, 2015). Pedagogy entails the study, selection and application of educational activities based on a certain theoretical framework, targeting the achievement of certain moral and philosophical goals.

In terms of scope, the concept of pedagogy entails classroom interactions (Li, 2008; Koçođlu, 2021), instruction methods, presentation of the course content, and instruction (Du et al., 2008; Anderson-Levitt, 2011; Koçođlu, 2021). It also includes several dimensions such

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as administration, evaluation, syllabi, instructional environments, student traits, instruction techniques, and teachers' competencies. The concept of pedagogy was also described as the art and science of instruction (Matuga, 2001), and entails all the activities associated with the objectives, content, methodology and evaluation of education based on the analysis of the instructor, environment and learners in various dimensions due to the instant access to education after globalization. Globalization has altered the content of educational disciplines as well as pedagogy (Smith, 2003; Koçoğlu, 2021), increasing the significance of this concept in learning and instruction (Koçoğlu and Egüz, 2019).

It could be suggested that pedagogical literacy skills that emerge in learning-teaching process based on the concept of pedagogy fulfill significant functions in the current world of education. These functions vary based on the teacher, course achievements, and the employed strategies, methods and techniques. Pedagogical literacy could be described as the competence that allows the teacher, a significant factor in the learning-teaching process, to make informed decisions in the selection of pedagogical instruments (Usta and Karakuş, 2016; Koçoğlu, 2021). It could be suggested that pedagogical literacy, which affects the development of teachers' behavior in education, is significant for the curricula that include textual applications that students could access easily, and meaningful and comprehensible activities in the learning-teaching process (Darling-Hammond and Bransford, 2005; Darling-Hammond, 2006; Kristina, 2010; Koçoğlu, 2021). Thus, the study aims to develop a pedagogical literacy scale, and the development stages of the scale are presented in the current paper. Furthermore, the findings on the differences between the pedagogical literacy levels of the teachers based on gender, educational level and professional seniority variables are discussed to test the functionality of the pedagogical literacy scale.

## METHODOLOGY

### The study group

The study was conducted with the data collected from two study groups. The first study group data were employed in exploratory factor analysis (EFA) during the development of the Pedagogical Literacy Scale, and the second study group data were employed in the confirmatory factor analysis (CFA) conducted during the development of the measurement tool.

In EFA, the scale was applied to 345 active teachers employed in various educational institutions at various levels in Yeşilyurt District in Malatya Province during the 2021-2022 academic years. 51.3% (n=177) of the teachers who participated in the EFA were females, 48.7% (n=168) were males, 22.3% were employed in pre-school institutions (n=77), 24.3% in primary schools (n=84), 26.4% in junior high schools (n=91), and 27% in high schools (n=93), while 20.6% (n=71) were employed for 1-5 years, 22.3% (n=77) for 6-10 years, 24.6% (n=85) for 11-15 years, 23.2% (n=80) for 16-20 years, and %9.3 (n=32) were employed for 21 or more years.

In Dynamic factor analysis (DFA), the scale was applied to 375 active teachers employed in various educational institutions at various levels in Battalgazi District in Malatya PROVINCE during the 2021-2022 academic years. 49.1% of the teachers who participated in the CFA were females (n=184), 50.9% (n=191) were males, 23.7% were employed in pre-school institutions (n=89), 21.3% in primary schools (n=80), 27.2% in junior high schools (n=102), 27.7% in high schools (n=104), while 20.3% (n=76) were employed for 1- 5 years, 24.5% (n=92) for 6-10 years, 22.1% (n=83) for 11-15 years, 22.9% (n=86) for 16-20 years, and 10.1% (n=38) were employed for 21 or more years.

### Development of the draft measurement tool

Before the development of the scale, an item pool was generated based on literature review and the views of teachers on pedagogical literacy. Then, the domestic and international literature on pedagogical literacy and related scales were reviewed to finalize the 37-item pool. The item pool was then submitted for the opinion of 3 experts. Based on the experts' opinion, 3 items were revised, and 4 items were removed from the item pool. After the revision, the pool included 33 five-point Likert type items.

### Data collection and analysis

Initially, the scale (demographic and scale items) was transferred to electronic media via Google Forms. The participants completed the scale online. A hyperlink was provided for the study group by the authors. Data collection lasted for two weeks. During the scale development, the scope and construct validity of the scale were determined. The content validity of the scale was determined by the review of the related literature and experts' opinion. EFA and CFA were conducted to determine the construct validity of the scale, and the internal consistency coefficient (Cronbach Alpha) and item-total correlations were calculated to determine reliability. The suitability of the data for factor analysis was determined with the Kaiser-Meyer-Olkin (KMO) coefficient and the Bartlett sphericity test.

## FINDINGS AND DISCUSSION

### Validity of the scale

The collected data were first transferred to the SPSS 22.0 software to determine their suitability for factor analysis with the Kaiser-Meyer-Olkin (KMO) coefficient and the Bartlett sphericity test. Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett sphericity test findings revealed that the data were suitable for factor analysis (Kaiser Meyer Olkin = 0.900, Bartlett's Test of Sphericity= 3350.568,  $p = 0.000$ ). The exploratory factor analysis was conducted to determine the items with a factor load of higher than 0.30, the presence of a difference of 0.10 or more between the factor loads of the items included in more than one factor, whether the eigenvalue of the factors was 1 or above, semantic and content consistency across the items in the same factor, high common factor variance, and whether the items explained 30% or more of the variance (Büyüköztürk, 2020). Thus, it was determined that 8 items did not fit the above-mentioned criteria and were removed from the

**Table 1.** Scale item analysis results.

	Factor 1	Factor 2	Factor 3	Factor 4	Anti-image correlation	Item total correlation
p21	0.604				0.925	0.472
p22	0.557				0.925	0.475
p24	0.721				0.905	0.596
p25	0.719				0.925	0.597
p26	0.752				0.923	0.673
p27	0.608				0.879	0.417
p31	0.625				0.921	0.562
p32	0.546				0.862	0.386
p1		0.556			0.914	0.457
p2		0.719			0.918	0.602
p3		0.609			0.902	0.550
p4		0.563			0.923	0.509
p5		0.682			0.904	0.573
p6		0.651			0.927	0.532
p10			0.729		0.912	0.681
p11			0.746		0.873	0.718
p13			0.801		0.877	0.702
p14			0.610		0.909	0.544
p33			0.674		0.805	0.562
p16				0.579	0.827	0.365
p17				0.647	0.731	0.428
p18				0.593	0.882	0.481
p19				0.556	0.889	0.482
p20				0.483	0.899	0.384
p23				0.475	0.866	0.393
Eigenvalue	7.823	2.486	1.477	1.254		
Total Explained Variance (%52,162)	16.884	12.875	12.440	9.963		
Cronbach Alpha	0.860	0.802	0.825	0.685		
Kaiser Meyer Olkin	0.900					
Bartlett's Test of Sphericity	3350.568					
p	0.000					

Source: Authors

scale. The results of the factor analysis conducted after the 8 items were removed from the scale are presented in Table 1.

The findings presented in Table 1 revealed that the scale had 4 factors. The first factor explained 16.884%, the second factor explained 12.875%, the third factor explained 12.440% and the fourth factor explained 9.963% of the total variance. The total variance explained by the four factors was 52.162%.

It was determined that the item loads in the first factor varied between "0.546" and "0.752"; the item-total correlation coefficients varied between "0.386" and "0.673", and anti-image correlation coefficients varied between "0.862" and "0.925". It was observed that the factor loads of the items in the second factor varied between "0.556" and "0.719"; the item-total correlation

coefficients varied between "0.457" and "0.602", and anti-image correlation coefficients varied between "0.902" and "0.927". It was observed that the factor loads of the items in the third factor varied between "0.610" and "0.801"; the item-total correlation coefficients varied between "0.544" and "0.718", and anti-image correlation coefficients varied between "0.805" and "0.912". It was observed that the factor loads of the items in the fourth factor varied between "0.475" and "0.647"; the item-total correlation coefficients varied between "0.365" and "0.482", and anti-image correlation coefficients varied between "0.731" and "0.899".

It was determined that the anti-image correlation coefficients of the scale items were above 0.5. It was concluded that all item data included in the analysis were suitable for factor analysis (Bursal, 2019, Can, 2017).

**Table 2.** Model goodness of fit based on CFA.

Good fit	Acceptable fit	Good fit	Goodness of fit
$\chi^2/sd$	$2 \leq \chi^2/sd \leq 5$	$0 \leq \chi^2/sd < 2$	1.85
GFI	$0.90 \leq GFI < 0.95$	$0.95 \leq GFI \leq 1.00$	0.91
AGFI	$0.85 \leq AGFI < 0.90$	$0.90 \leq AGFI \leq 1.00$	0.88
NFI	$0.90 \leq NFI < 0.95$	$0.95 \leq NFI \leq 1.00$	0.87
IFI	$0.90 \leq IFI < 0.95$	$0.95 \leq IFI \leq 1.00$	0.93
CFI	$0.90 \leq CFI < 0.95$	$0.95 \leq CFI \leq 1.00$	0.93
RMSEA	$0.05 \leq RMSEA \leq 0.08$	$0 \leq RMSEA < 0.05$	0.04
RMR	$0.05 \leq RMR \leq 0.08$	$0 \leq RMR < 0.05$	0.03

Source: Bayram, (2010), Çelik and Yılmaz (2013), Çokluk et al. (2010), Harrington (2009), Kline (2010), and Schermelleh-Engel et al. (2003).

Based on the content of the factors, the first factor was named "Learning-Teaching Process", the second factor was named "Classroom Management", the third factor was named "Measurement and Evaluation," and the fourth factor was named "Counseling". Confirmatory factor analysis was conducted to analyze the model-data fit of the constructs determined in the exploratory factor analysis. The confirmatory factor analysis tests and confirms the hypotheses based on the results of the previous analysis of the variables, and the factor constructs determined in the exploratory factor analysis (Özdamar, 2016).

In confirmatory factor analysis, the error variances and t values of the items are analyzed to decide which items to discard. In the analysis, a t value higher than 1.96 indicates that it is significant at 0.05 confidence level, a t value higher than "2.56" indicates that it is significant at 0.01 confidence level, and a t value lower than 1.96 indicates that it is not significant (Cokluk et al., 2010). In confirmatory factor analysis, all criteria were confirmed. The model goodness of fit values obtained in the confirmatory factor analysis is presented in Table 2.

Fit index values obtained with the confirmatory factor analysis are as follows:  $\chi^2/Sd= 1.85$ ,  $GFI = 0.91$ ,  $AGFI = 0.88$ ,  $NFI= 0.87$ ,  $IFI= 0.93$ ,  $CFI = 0.93$ ,  $RMSEA = 0.04$ ,  $RMR = 0.03$ . A  $\chi^2 /Sd$  below 2 indicates good fit. Greater than 0.90 GFI, IFI, CFI and greater than 0.85 AGFI indicate acceptable fit. RMSEA and RMR below 0.05 indicate a good fit (Cokluk et al., 2016). Based on the analysis, it could be suggested that the scale had good construct validity (Özdamar, 2016). Thus, the exploratory factor analysis findings were confirmed by the confirmatory factor analysis. The path diagram for the Pedagogical Literacy Scale is presented in Figure 1.

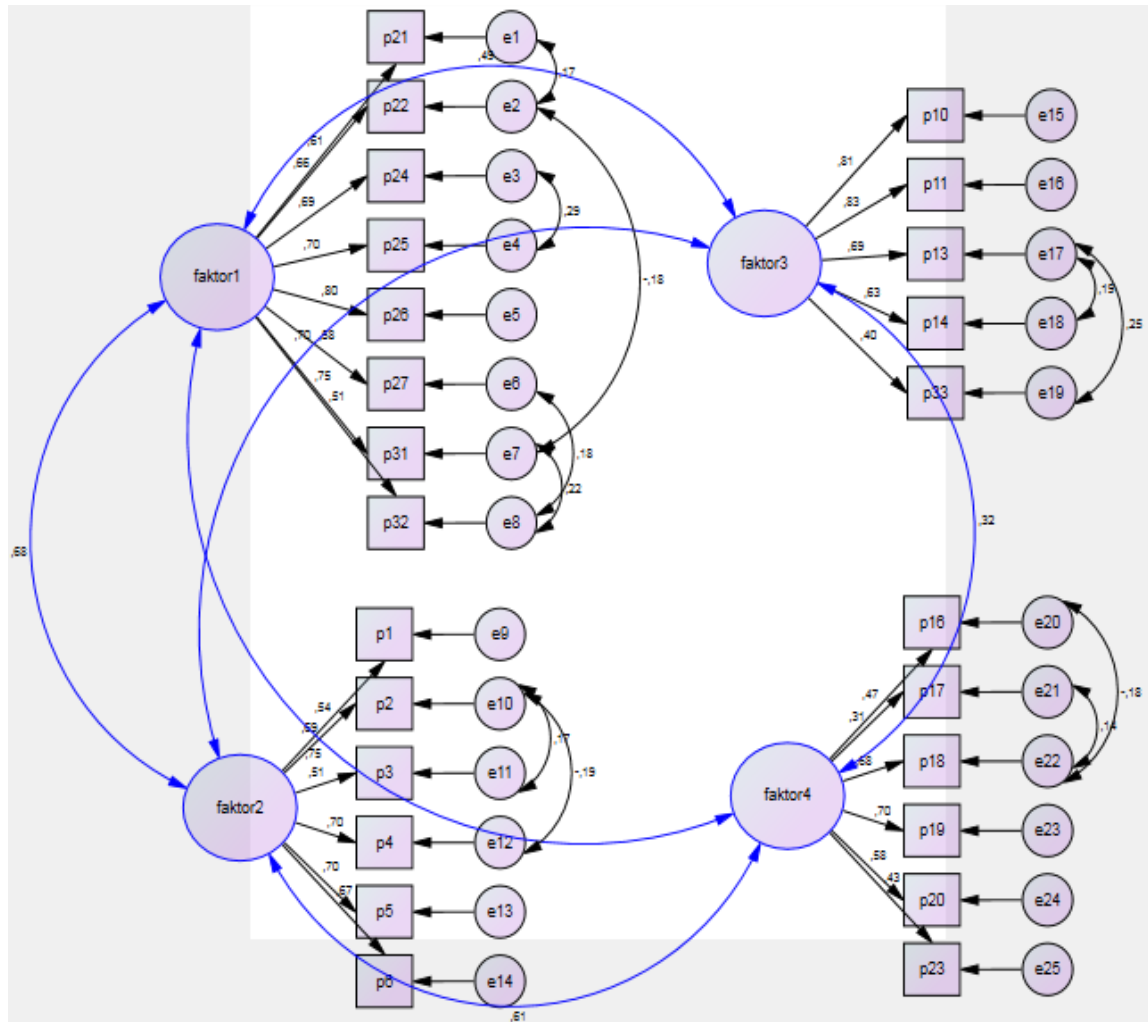
The overall review of the confirmatory factor analysis results suggested that the model-data fit of the scale was acceptable. Thus, EFA and CFA results confirmed the construct validity of the Pedagogical Literacy Scale. The final Pedagogical Literacy Scale that included 25 items and 4 sub-dimensions was confirmed with the CFA and presented in Table 3.

### Reliability findings

In the reliability analysis of the scale, it was determined that the Cronbach Alpha internal consistency coefficient was 0.868 for the "Learning-Teaching Process" sub-dimension, 0.799 for the "Classroom Management" sub-dimension, 0.700 for the "Measurement and Evaluation" sub-dimension, and 0.819 for the "Counseling" sub-dimension. The total Cronbach Alpha internal consistency coefficient for the scale was calculated as 0.901. A reliability coefficient of 0.70 or above reflects scale reliability (Büyüköztürk, 2020). It was concluded that the pedagogical literacy Scale was reliable. Table 4 show the factor of cronbach alpha coefficients based on CFA.

### Pedagogical literacy scale application findings

In the study, the final version of the pedagogical literacy scale that included 25 items and 4 sub-dimensions, the validity and reliability of which were confirmed, was applied to 412 teachers employed in various education institutions at various levels to determine the pedagogical literacy levels of the teachers. Furthermore, the differences between the pedagogical literacy levels of the teachers were investigated based on gender, educational level, and professional seniority variables. In the study, independent samples t-test was conducted to determine the differences based on gender and educational level, and ANOVA was conducted to determine the differences based on professional seniority. As seen in Table 5, the mean pedagogical literacy level of the participating teachers was at the "I strongly agree ( $\bar{X}=3.82$ )" level. The pedagogical literacy level of the teachers in the "Learning-Teaching Process" sub-dimension was at "I strongly agree ( $\bar{X}=3.71$ )" level, and the pedagogical literacy level of the teachers in the "Class Management" sub-dimension was at "I strongly agree ( $\bar{X}=3.69$ )" level. The pedagogical literacy level of teachers in the "Assessment and Evaluation" sub-dimension was at "I



**Figure 1.** The path diagram for pedagogical literacy scale standardized analysis results. Source: Authors

strongly agree ( $\bar{x} = 3,90$ )" level, and the pedagogical literacy level of teachers in the "Counseling" sub-dimension was at "I strongly agree ( $\bar{x} = 4,05$ )" level.

The findings were determined with the inductive analysis conducted with the independent samples t-test on the research problem "Is there a significant difference between the pedagogical literacy level of the teachers based on gender?" (Table 6).

The independent samples t-test findings conducted to determine the differences between the pedagogical literacy levels of the participating teachers based on the gender variable are presented in Table 6. It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the gender variable ( $t = 1,514$ ;  $p = 0,00$ ). The significant difference favored the female teachers since the pedagogical literacy levels of female teachers were significantly higher than that of the male teachers ( $Mean_{female} = 3,92 > Mean_{male} = 3,72$ ). Thus, it

could be suggested that the pedagogical literacy level of teachers was not similar based on gender, and gender affected the pedagogical literacy level of the teachers.

The differences between the pedagogical literacy levels of the teachers based on the gender variable were as follows based on the pedagogical literacy scale sub-dimensions. It was determined that the pedagogical literacy levels of the teachers differed significantly by gender ( $t = 2,240$ ;  $p = 0,00$ ) in the "Learning-Teaching Process" sub-dimension. The significant difference in the "Learning-Teaching Process" sub-dimension favored female teachers since the pedagogical literacy levels of female teachers were significantly higher than that of male teachers ( $Mean_{female} = 3,84 > Mean_{male} = 3,57$ ). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on gender in the "Learning-Teaching Process" sub-dimension, and gender affected teachers' pedagogical literacy levels in the "Learning-Teaching Process" sub-dimension.

**Table 3.** The final Pedagogical Literacy Scale after CFA.

	Item
Learning-teaching process	1- I act based on the fact that each student is developmentally different in the class.
	2- I diversify activities since each student has developmental differences.
	3- I design, plan, and implement the instruction based on personal differences.
	4- I act with the knowledge that each student has a capacity.
	5- I believe that each student could be successful.
	6- I believe that meaningful, permanent, and concrete learning is possible with student-centered education.
	7- I determine instructional strategies, methods, and techniques based on the developmental level of the students, the topic, or target achievements.
	8- I include interesting activities to improve students' interest, curiosity, and motivation.
Class management	9- O prioritizes democracy in the learning environment.
	10- I determine classroom rules with the students.
	11- My language is clear, comprehensible and interactive when correcting undesired student behavior.
	12- I call my students with their names, not with pronouns.
	13- I help students in effective use of time.
	14- I listen to and consider the student views and suggestions about the course.
Measurement and evaluation	15- I consider school conditions in measurement and evaluation.
	16- I measure student development and performance in predetermined intervals.
	17- I provide measurement results without delay.
	18- I assess measurement results with an explanatory language instead of a judgmental approach.
Counseling	19- I believe that student achievements vary based on readiness.
	20- I assist the students with their scholar and extracurricular problems.
	21- I collaborate with the parents about student problems.
	22- I believe that sharing problems with the teachers would affect resolving these problems.
	23- I support acquisition of universal humanitarian values by the students.
	24- I assist self-awareness, environmental awareness, and future plans of the students.
	25- I inform the parents about the developmental and educational status of their children.

Source: Authors

**Table 4.** Factor Cronbach Alpha coefficients based on CFA.

	Sub-dimension	Item count	Cronbach alpha
1	Learning-teaching process	8	0.868
2	Class management	6	0.799
3	Measurement and evaluation	5	0.700
4	Counseling	6	0.819
	Total	25	0.901

Source: Authors

It was determined that the pedagogical literacy levels of the teachers differed significantly by gender ( $t= 1.420$ ;  $p= 0.01$ ) in the "Class Management" sub-dimension. The significant difference in the "Class Management" sub-dimension favored female teachers since the pedagogical literacy levels of female teachers were significantly higher than that of male teachers ( $Mean_{female}=3.80>$

$Mean_{male}=3.59$ ). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on gender in the "Class Management" sub-dimension, and gender affected teachers' pedagogical literacy levels in the "Class Management" sub-dimension.

It was determined that the pedagogical literacy levels of the teachers differed significantly by gender ( $t= 0.451$ ;  $p=$

**Table 5.** Descriptive statistics on the pedagogical literacy levels of the teachers.

Pedagogical literacy scale	$\bar{X}$	SS
Learning-teaching process	3.71	0.855
Class management	3.69	0.899
Measurement and evaluation	3.90	0.751
Counseling	4.05	0.772
Total pedagogical literacy	3.82	0.754

Source: Authors

**Table 6.** The analysis of the pedagogical literacy of the teachers based on gender.

	Group	n	$\bar{X}$	SD	t	p
Learning-teaching process	Female	209	3.84	0.765	2.240	0.00*
	Male	203	3.57	0.921		
Class management	Female	209	3.80	0.852	1.420	0.01*
	Male	203	3.59	0.935		
Pedagogical literacy scale Measurement and evaluation	Female	209	3.97	0.571	0.451	0.04*
	Male	203	3.82	0.894		
Counseling	Female	209	4.12	0.595	0.571	0.03*
	Male	203	3.96	0.913		
Total pedagogical literacy	Female	209	3.92	0.611	1.514	0.00*
	Male	203	3.72	0.867		

\*p &lt; 0.05.

Source: Authors

0.04) in the "Measurement and Evaluation" sub-dimension. The significant difference in the "Measurement and Evaluation" sub-dimension favored female teachers since the pedagogical literacy levels of female teachers were significantly higher than that of male teachers ( $Mean_{female}=3.97 > Mean_{male}=3.82$ ). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on gender in the "Measurement and Evaluation" sub-dimension, and gender affected teachers' pedagogical literacy levels in that sub-dimension. It was determined that the pedagogical literacy levels of the teachers differed significantly by gender ( $t= 0.571$ ;  $p= 0.03$ ) in the "Counseling" sub-dimension. The significant difference in the "Counseling" sub-dimension favored female teachers since the pedagogical literacy levels of female teachers were significantly higher than that of male teachers ( $Mean_{female}=4.12 > Mean_{male}=3.96$ ). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on gender in the "Counseling" sub-dimension, and gender affected teachers' pedagogical literacy levels in that sub-dimension. The findings

determined with the inductive analysis conducted with the independent samples t-test on the research problem "Is there a significant difference between the pedagogical literacy level of the teachers based on education level?" are presented in Table 7.

The independent samples t-test findings conducted to determine the differences between the pedagogical literacy levels of the participating teachers based on the education level variable are presented in Table 7. It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the education level variable ( $t= -6.542$ ;  $p= 0.00$ ). The significant difference favored the teachers with graduate degrees since the pedagogical literacy levels of teachers with graduate degrees were significantly higher than that of the teachers with undergraduate degrees ( $Mean_{grad}=4.23 > Mean_{undergrad}=3.69$ ). Thus, it could be suggested that the pedagogical literacy level of teachers was not similar based on education level, and education level affected the pedagogical literacy level of the teachers. The differences between the pedagogical literacy levels of

**Table 7.** The analysis of the pedagogical literacy of the teachers based on education level.

		Group	n	$\bar{X}$	SS	t	p
<b>Pedagogical literacy scale</b>	Learning-teaching process	Undergraduate	312	3.58	0.783	-5.214	0.00*
		Graduate	100	4.12	0.940		
	Class management	Undergraduate	312	3.52	0.842	-7.220	0.00*
		Graduate	100	4.23	0.867		
	Measurement and evaluation	Undergraduate	312	3.79	0.755	-5.249	0.00*
		Graduate	100	4.23	0.634		
	Counseling	Undergraduate	312	3.93	0.797	-5.353	0.00*
		Graduate	100	4.39	0.562		
	Total pedagogical literacy	Undergraduate	312	3.69	0.722	-6.542	0.00*
		Graduate	100	4.23	0.709		

\*p &lt; 0.05.

Source: Authors

the teachers based on the education level variable were as follows based on the pedagogical literacy scale sub-dimensions: It was determined that the pedagogical literacy levels of the teachers differed significantly by education level ( $t = -5.214$ ;  $p = 0.00$ ) in the "Learning-Teaching Process" sub-dimension. The significant difference in the "Learning-Teaching Process" sub-dimension favored teachers with graduate degrees since the pedagogical literacy levels of teachers with graduate degrees were significantly higher than that of the teachers with undergraduate degrees ( $Mean_{grad} = 4.12 > Mean_{undergrad} = 3.58$ ). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on education level in the "Learning-Teaching Process" sub-dimension, and education level affected teachers' pedagogical literacy levels in the "Learning-Teaching Process" sub-dimension. It was determined that the pedagogical literacy levels of the teachers differed significantly by education level ( $t = -7.220$ ;  $p = 0.00$ ) in the "Class Management" sub-dimension. The significant difference in the "Class Management" sub-dimension favored teachers with graduate degrees since the pedagogical literacy levels of teachers with graduate degrees were significantly higher than that of the teachers with undergraduate degrees ( $Mean_{grad} = 4.23 > Mean_{undergrad} = 3.52$ ). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on education level in the "Class Management" sub-dimension, and education level affected teachers' pedagogical literacy levels in that sub-dimension.

It was determined that the pedagogical literacy levels of the teachers differed significantly by education level ( $t = -5.249$ ;  $p = 0.00$ ) in the "Measurement and Evaluation" sub-dimension. The significant difference in the "Measurement and Evaluation" sub-dimension favored teachers with graduate degrees since the pedagogical

literacy levels of teachers with graduate degrees were significantly higher than that of the teachers with undergraduate degrees ( $Mean_{grad} = 4.23 > Mean_{undergrad} = 3.79$ ). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on education level in the "Measurement and Evaluation" sub-dimension, and education level affected teachers' pedagogical literacy levels in that sub-dimension.

It was determined that the pedagogical literacy levels of the teachers differed significantly by education level ( $t = -5.353$ ;  $p = 0.00$ ) in the "Counseling" sub-dimension. The significant difference in the "Counseling" sub-dimension favored teachers with graduate degrees since the pedagogical literacy levels of teachers with graduate degrees were significantly higher than that of the teachers with undergraduate degrees ( $Mean_{grad} = 4.39 > Mean_{undergrad} = 3.93$ ). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on education level in the "Counseling" sub-dimension, and education level affected teachers' pedagogical literacy levels in that sub-dimension.

The findings were determined with the inductive analysis conducted with the independent samples t-test on the research problem "Is there a significant difference between the pedagogical literacy level of the teachers based on seniority?" (Table 8).

The ANOVA finding showed the differences between the pedagogical literacy levels of the participating teachers based on the seniority variable presented in Table 8. It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the seniority variable ( $F = 4.729$ ;  $p = 0.00$ ). The Tukey test result demonstrated that significant differences were between the teachers with 1-5 years of seniority and those with 6-10 years and 21 years seniority or higher. Furthermore, the analysis of the



**Table 8.** The analysis of the pedagogical literacy of the teachers based on seniority.

		Group (years)	n	$\bar{X}$	SS	F	p
<b>Pedagogical literacy scale</b>	Learning-teaching process	1-5	89	4.03	0.726	5.839	0.00* 1>2 1>3 1>5
		6-10	96	3.61	0.840		
		11-15	94	3.63	0.713		
		16-20	94	3.73	0.782		
		≥21	39	3.34	1.323		
		Total	412	3.71	0.855		
	Class management	1-5	89	4.15	0.717	7.931	0.00* 1>2 1>3 1>4 1>5
		6-10	96	3.61	0.875		
		11-15	94	3.51	0.728		
		16-20	94	3.56	0.824		
		≥21	39	3.65	1.431		
		Total	412	3.69	0.899		
	Measurement and evaluation	1-5	89	3.95	0.590	3.631	0.00* 1>5 2>5 3>5 4>5
		6-10	96	3.90	0.750		
		11-15	94	3.98	0.578		
		16-20	94	3.95	0.660		
		≥21	39	3.48	1.339		
		Total	412	3.90	0.751		
	Counseling	1-5	89	4.20	0.607	4.031	0.00* 1>5 3>5 4>5
		6-10	96	3.97	0.782		
11-15		94	4.11	0.571			
16-20		94	4.08	0.681			
≥21		39	3.65	1.371			
Total		412	4.05	0.772			
Total pedagogical literacy	1-5	89	4.08	0.580	4.729	0.00* 1>2 1>5	
	6-10	96	3.75	0.764			
	11-15	94	3.79	0.569			
	16-20	94	3.82	0.668			
	≥21	39	3.52	1.328			
	Total	412	3.82	0.754			

\*p&lt;0.05.

Source: Authors

mean scores demonstrated that the pedagogical literacy levels of teachers with 1-5 years seniority were significantly higher than the teachers with 6-10 years and 21 years seniority or higher. Thus, it could be suggested that the pedagogical literacy level of the teachers was not similar based on seniority, and seniority affected the pedagogical literacy level of the teachers.

The differences between the pedagogical literacy levels of the teachers based on the seniority variable were as follows based on the pedagogical literacy scale sub-dimensions. It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the seniority variable in the “Learning-Teaching Process” sub-dimension (F=

5.839; p= 0.00). The Tukey HSD test result demonstrated that significant differences were between the teachers with 1-5 years of seniority and those with 6-10 years, 1—15 years and 21 years seniority or higher in the “Learning-Teaching Process” sub-dimension. Furthermore, the analysis of the mean scores revealed that the pedagogical literacy levels of teachers with 1-5 years seniority was significantly higher than the teachers with 6-10 years, 11-15 years, and 21 years seniority or higher in the “Learning-Teaching Process” sub-dimension. Thus, it could be suggested that the pedagogical literacy level of teachers was not similar based on seniority in the “Learning-Teaching Process” sub-dimension, and seniority affected the pedagogical literacy level of the teachers in

that dimension.

It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the seniority variable in the "Class Management" sub-dimension ( $F= 7.931$ ;  $p= 0.00$ ). The Tukey HSD test result demonstrated that significant differences were between the teachers with 1-5 years of seniority and those with higher seniority in the "Class Management" sub-dimension. Furthermore, the analysis of the mean scores revealed that the pedagogical literacy levels of teachers with 1-5 years seniority was significantly higher than the teachers with higher seniority in the "Class Management" sub-dimension. Thus, it could be suggested that the pedagogical literacy level of teachers was not similar based on seniority in the "Class Management" sub-dimension, and seniority affected the pedagogical literacy level of the teachers in that dimension.

It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the seniority variable in the "Measurement and Evaluation" sub-dimension ( $F= 3.631$ ;  $p= 0.00$ ). The Tukey HSD test result demonstrated that significant differences were between the teachers with 21 years or higher seniority and those in the other seniority groups in the "Measurement and Evaluation" sub-dimension. Furthermore, the analysis of the mean scores revealed that the pedagogical literacy levels of teachers with 21 years or higher seniority was significantly higher than the other groups in the "Measurement and Evaluation" sub-dimension. Thus, it could be suggested that the pedagogical literacy level of teachers was not similar based on seniority in the "Measurement and Evaluation" sub-dimension, and seniority affected the pedagogical literacy level of the teachers in that dimension.

It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the seniority variable in the "Counseling" sub-dimension ( $F= 4.031$ ;  $p= 0.00$ ). The Tukey HSD test result demonstrated that significant differences were between the teachers with 21 years or higher seniority and those in the other seniority groups in the "Counseling" sub-dimension. Furthermore, the analysis of the mean scores revealed that the pedagogical literacy levels of teachers with 21 years or higher seniority was significantly higher than the other groups in the "Counseling" sub-dimension. Thus, it could be suggested that the pedagogical literacy level of teachers was not similar based on seniority in the "Counseling" sub-dimension, and seniority affected the pedagogical literacy level of the teachers in that dimension.

## Conclusion

The present study aimed to develop a valid and reliable pedagogical literacy scale based on teachers' views. The

37-item draft scale was applied to two sample groups, which included 345 teachers in the exploratory factor analysis group and 375 teachers in the confirmatory factor analysis group. Before the exploratory factor analysis, the draft scale included 37 items. However, based on the experts' opinion, three items were revised, and four items removed, and EFA was conducted on the 33-itemscale. EFA revealed that there were 4 factors in the 25-item scale.

Based on the content of the items in each factor, the first factor was named "Learning-Teaching Process", the second factor was named "Classroom Management", the third factor was named "Measurement and Evaluation", and the fourth factor was named "Counseling". Confirmatory factor analysis revealed that the model-data fit of the scale was acceptable. The Cronbach Alpha internal consistency coefficient of the scale revealed that the scale was reliable. Thus, the validity and reliability analysis demonstrated that the scale was a valid and reliable measurement tool that could be employed to measure the pedagogical literacy levels of teachers.

The pedagogical literacy scale developed in the current study included 25 items, and none of these items is reverse scored. The "Learning-Teaching Process" sub-dimension included 8 items (Items 1, 2, 3, 4, 5, 6, 7 and 8 in Table 3), and the lowest scale score was 8 and the highest scale score was 40. A higher score in this dimension reflected that the teachers considered individual differences and students' development in the learning-teaching process; and thus, they diversified classroom activities, learning-teaching methods and techniques. Furthermore, a high score in the "Learning-Teaching Process" sub-dimension indicated that a student-centered learning process was adopted in the classroom.

The Classroom Management sub-dimension included 6 items (items 9, 10, 11, 12, 13 and 14 in Table 3), and the lowest possible score was 6 and the highest score was 30. A high score in this dimension reflected that the teachers adopted a democratic classroom management, collaborated with the students, and they had classroom management skills that prevented undesirable behavior.

The Measurement and Evaluation sub-dimension included 5 items (items 15, 16, 17, 18 and 19 in Table 3), and the lowest score was 5 and the highest score was 25. A higher score in this dimension reflected that the teachers conducted measurement and evaluation activities based on school conditions and students; they shared measurement-evaluation activities with the students, and noticed the changes in the students.

The counseling sub-dimension included 6 items (items 20, 21, 22, 23, 24 and 25 in Table 3), and the lowest score was 6 and the highest score was 30. A higher score in this dimension exhibited that teachers helped students to solve their scholar or extracurricular problems, collaborated with the parents, helped students plan their future based on their potential, and facilitated acquisition of universal humanitarian values.

It could be suggested that the pedagogical literacy scale developed in the study is a valid, reliable and functional scale that could be employed to determine the views of teachers employed in educational institutions at various levels on pedagogical literacy. Validity and reliability of the pedagogical literacy scale could be reconducted with different sample groups. A different or more comprehensive pedagogical literacy scale that would consider the behavior of other educational stakeholders such as parents and school administration could be developed.

The current study evidenced the validity and reliability of the final version of the pedagogical literacy scale that included 25 items and 4 sub-dimensions, and the scale was applied to 412 teachers employed in educational institutions at various levels to determine the pedagogical literacy levels of the teachers. The analysis demonstrated that the pedagogical literacy of the participating teachers was aggregable. Thus the pedagogical literacy levels of the teachers were good.

In the study, it was concluded that there were significant differences between the pedagogical literacy of the teachers based on the gender variable. The significant difference between the pedagogical literacy levels of the teachers based on the gender variable favored the female teachers, since the pedagogical literacy levels of female teachers were significantly higher than that of the male teachers. These findings revealed that the pedagogical literacy levels of the teachers was not similar based on the gender variable and gender affected the pedagogical literacy level of the teachers.

In the study, it was determined that the pedagogical literacy levels of the teachers differed significantly based on their educational level. The significant difference between the pedagogical literacy levels of the teachers based on their educational level favored the teachers with graduate degrees, since the pedagogical literacy level of the teachers with graduate degrees was significantly higher than that of the teachers with undergraduate degrees. These findings demonstrated that the pedagogical literacy levels of the teachers were not similar based on educational level and the educational level affected the pedagogical literacy of the teachers.

In the study, it was concluded that there were significant differences between the pedagogical literacy levels of the teachers based on the seniority variable. The significant differences between the pedagogical literacy levels of teachers based on seniority demonstrated that the pedagogical literacy levels of teachers were not similar based on seniority, and seniority affected the pedagogical literacy of the teachers. The analysis of the teacher scores based on the variable of seniority revealed that the pedagogical literacy levels of the teachers with 1-5 years of seniority of 1-5 years were higher than other teachers.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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