

The Mediating Role of Innovativeness in the Relationship Between Teachers' Proactive Personality and Digital Literacy Perceptions

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Abstract

This study examined the mediating role of individual innovativeness in the relationship between teachers' proactive personality and digital literacy perceptions, using a correlational survey design. The sample consisted of 322 teachers working in schools affiliated with the Ministry of National Education in Gaziantep, Türkiye, selected through convenience sampling. Data were collected online using the Proactive Personality Scale, the Digital Literacy Skills Scale, and the Individual Innovativeness Scale, and analyzed using descriptive statistics, independent-samples *t* tests, one-way ANOVA, Pearson correlation, multiple linear regression, and Hayes' PROCESS Macro (Model 4; 5,000 bootstrap samples). Results revealed positive and significant relationships between proactive personality and digital literacy ($r = .417, p < .01$), proactive personality and innovativeness ($r = .488, p < .01$), and innovativeness and digital literacy ($r = .342, p < .01$). Proactive personality ($\beta = .329, p < .001$) and innovativeness ($\beta = .181, p = .002$) significantly predicted digital literacy, explaining 19.9% of variance ($R^2 = .199, F(2, 319) = 39.628, p < .001$). Mediation analysis showed that both the total effect ($B = .428, \beta = .417, p < .001$) and the direct effect ($B = .337, \beta = .329, 95\% \text{ CI } [.221, .453]$) were significant, and the indirect effect through innovativeness was also significant ($B = .091, 95\% \text{ CI } [.032, .159]$), indicating partial mediation. No significant differences emerged across gender, age, seniority, school tenure, or school level (all $p > .05$). These findings highlight the importance of fostering proactive personality and innovativeness to enhance teachers' digital literacy.

Keywords: teacher, proactive personality, digital literacy, innovativeness, education

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Introduction

In the rapidly transforming world of the 21st century, the teaching profession has evolved beyond the mere transmission of knowledge to encompass the design and facilitation of learning processes as well as leadership in educational change (Darling-Hammond, 2006; Schleicher, 2018). One of the key constructs associated with this transformation is proactive personality, which refers to an individual's tendency to initiate change by recognizing opportunities rather than passively accepting existing conditions. Proactive personality is defined as an individual's tendency to take initiative to influence their environment, identify opportunities, and sustain efforts until meaningful change is achieved (Bateman & Crant, 1993; Crant, 2000). Rather than accepting existing conditions, proactive individuals seek to improve them, develop a vision for the future, and engage in behaviors aimed at influencing their environment (Crant, 2000). Accordingly, proactive personality is regarded as a relatively stable behavioral disposition characterized by identifying opportunities, taking initiative, acting, and persisting until change is achieved (Bateman & Crant, 1993; Parker et al., 2006). Individuals with this personality trait actively shape their environment rather than simply adapting to existing conditions (Parker et al., 2006). In educational settings, teachers' proactive personality has been found to be positively associated with self-efficacy and openness to change. Teachers with higher levels of proactive personality demonstrate lower resistance to change and innovation in schools and participate more actively in change processes (Bozbayındır & Alev, 2018). In addition, proactive individuals are more willing to adopt new technologies, keep up with technological developments, and take initiative in the use of technology. Within educational settings, teachers with proactive characteristics are more likely to view technological innovations as opportunities and to take an active role in integrating them into teaching and learning processes (Kukal & Töre, 2024). In this context, digital literacy is likely to be associated with teachers' proactive personality.

According to Gilster (1997), digital literacy extends beyond technical skills to include the ability to critically evaluate and effectively use digital resources. Similarly, Eshet-Alkalai (2004) conceptualized digital literacy as a multidimensional construct encompassing photo-visual, reproduction, branching, information, and socio-emotional literacy, rather than merely technical operational skills. From this perspective, digital literacy is considered a fundamental life skill that enables individuals to access, evaluate, produce, and share information effectively (Fraillon et al., 2020). Falloon (2020) further argues that teacher education should move beyond a narrow focus on technical skills and adopt a broader perspective that enables teachers to integrate technology effectively into pedagogical processes. Accordingly, digital literacy encompasses not only the ability to use digital technologies but also the capacity to adapt to a rapidly changing digital environment, learn emerging technologies, and use them effectively for professional purposes. Therefore, digital literacy can be considered closely related to proactive behavioral tendencies (Ozkan-Hidiroglu et al., 2021).

Innovativeness may serve as an important mediating mechanism in this relationship. According to Rogers (2003), an innovation is an idea, practice, or object that is perceived as new by an individual or another unit of adoption. Innovativeness refers to an individual's tendency to adopt, develop, and implement new ideas (Hurt et al., 1977; Kılıçer & Odabaşı, 2010). In the teaching profession, innovativeness is reflected in trying new instructional methods, using digital tools for pedagogical purposes, diversifying learning environments, and adopting a development-oriented attitude rather than resisting change (Kılıçer & Odabaşı, 2010).

Previous research has shown that individuals with high levels of personal innovativeness are more willing to experiment with and adopt new technologies and develop more positive attitudes toward technology adoption (Agarwal & Prasad, 1998; Yi et al., 2006). Similarly, proactive personality has been identified as an important antecedent of innovative behavior. As teachers' proactive personality increases, their innovative work behaviors also increase (Ertürk, 2023; Pan et al., 2021; Siregar et al., 2026). Likewise, Bozbayındır and Alev (2018) reported that proactive personality is positively associated with teachers' openness to change. Because proactive individuals actively seek to improve their environment, they tend to be more receptive to innovative practices, which may increase their willingness to adopt and use new technologies. Accordingly, the influence of proactive personality on digital literacy may not be entirely direct but may operate through innovativeness. In other words, innovativeness may function as a mechanism through which proactive personality contributes to teachers' digital literacy.

Previous studies have also reported positive relationships between teachers' digital literacy and individual innovativeness (Çapraz, 2023; Özkurt, 2022). For example, Çapraz (2023) found a moderate, positive, and significant relationship between teachers' digital literacy and individual innovativeness. Similarly, Ocak and Kuş Serin (2024) reported that teachers' digital literacy and individual innovativeness together significantly predicted their information technology use. These findings suggest that individuals with stronger innovative tendencies are more willing to learn and adopt new technologies and are therefore better positioned to develop their digital literacy.

Although previous studies have examined proactive personality, innovativeness, and digital literacy, they have primarily focused on the direct relationships among these variables. Consequently, the psychological mechanisms underlying digital literacy remain underexplored. In particular, research examining the personality-based antecedents of digital literacy and the mechanisms through which these antecedents operate is limited. Examining teachers' digital literacy and innovativeness is important for understanding their capacity to adapt to educational change and integrate technology into teaching. This study is expected to contribute to the literature by explaining the psychological antecedents of digital literacy, identifying the individual characteristics that support teachers' adaptation to digital transformation, and providing practical implications for teacher education and professional development. Accordingly, this study aims to examine the mediating role of innovativeness in the relationship between teachers' proactive personality and digital literacy. To achieve this aim, the following research questions were addressed:

1. Do teachers' proactive personality, innovativeness, and digital literacy differ significantly according to gender, age, professional seniority, tenure at their current school, and school level?
2. What are the direction and strength of the relationships among teachers' proactive personality, innovativeness, and digital literacy?
3. Do proactive personality and innovativeness significantly predict teachers' digital literacy?
4. Does innovativeness mediate the relationship between proactive personality and digital literacy?

Method

Research Model

This study employed a correlational survey design, a quantitative research method, to examine the mediating role of individual innovativeness in the relationship between teachers' proactive personality and digital literacy. A correlational survey design is used to examine the relationships among two or more variables (Büyüköztürk et al., 2015). In the present study, proactive personality was treated as the independent variable, digital literacy as the dependent variable, and individual innovativeness as the mediating variable. The model tested whether individual innovativeness mediated the relationship between proactive personality and digital literacy.

Participant

The population of the study consisted of teachers working in schools affiliated with the Ministry of National Education in Gaziantep, Türkiye. The sample comprised 322 teachers who were selected through convenience sampling and voluntarily participated in the study. Of the participants, 57.1% were female and 42.9% were male. Regarding age, 28.6% were between 22 and 30 years, 36.6% were between 31 and 40 years, 24.8% were between 41 and 50 years, and 9.9% were 51 years or older. Professional seniority was distributed as follows: 28.6% had 1–5 years of experience, 23.0% had 6–10 years, 25.8% had 11–20 years, and 22.7% had more than 20 years of experience. Regarding tenure at the current school, 42.9% had worked there for 0–2 years, 26.7% for 3–5 years, 20.2% for 6–9 years, and 10.2% for 10 years or more. The participants worked at the preschool (9.3%), primary school (24.8%), middle school (30.1%), and high school (35.7%) levels.

Data Collection Instruments

The study used a Personal Information Form, the Brief Proactive Personality Scale, the Digital Literacy Skills Scale, and the Individual Innovativeness Scale.

Personal Information Form

The Personal Information Form was developed by the researcher and included items on participants' gender, age, professional seniority, tenure at their current school, and school level.

Short Proactive Scale

Teachers' proactive personality was measured using the Short Proactive Personality Scale developed by Bateman and Crant (1993) and adapted into Turkish by Akın et al. (2015). The scale consists of 10 items with a one-dimensional structure and is rated on a 7-point Likert scale. Higher scores indicate higher levels of proactive personality. In this study, the total score was used in the analyses. The Cronbach's alpha coefficient of the scale was .852.

Digital Literacy Skills Scale

Teachers' digital literacy was measured using the Digital Literacy Skills Scale developed by Özden et al. (2024). The scale consists of 15 items rated on a 5-point Likert scale and

includes three dimensions: *tool selection and guidance appropriate to the objective, critical reading, and safe and critical writing*. The total score was used in the analyses. The Cronbach's alpha coefficient of the scale was .899.

Individual Innovativeness Scale

Teachers' individual innovativeness was measured using the Individual Innovativeness Scale developed by Hurt et al. (1977) and adapted into Turkish by Kılıçer and Odabaşı (2010). The scale consists of 20 items. Higher scores indicate higher levels of individual innovativeness. The total score was used in the analyses. The Cronbach's alpha coefficient of the scale was .852.

Data Analysis

The data were analyzed using IBM SPSS Statistics 27. Before conducting the analyses, assumptions regarding normality, reliability, and outliers were examined. The internal consistency of the scales was assessed using Cronbach's alpha coefficients, which are reported in the relevant sections above.

Outliers were identified using standardized z scores, and no outlying observations were detected that could affect the analyses. Normality was assessed by examining skewness and kurtosis values. Skewness values ranged from -0.574 to -0.123 , while kurtosis values ranged from 0.048 to 0.924 . As these values were within the acceptable range, the data were considered normally distributed, and parametric statistical analyses were conducted.

To address the research questions, independent-samples t tests, one-way analysis of variance (ANOVA), Pearson correlation analysis, and multiple linear regression analysis were performed. The mediating role of individual innovativeness in the relationship between proactive personality and digital literacy was examined using Hayes' PROCESS Macro (Model 4). The significance of the indirect effect was evaluated using 5,000 bootstrap resamples and a 95% confidence interval. An indirect effect was considered significant when the confidence interval did not include zero (Hayes, 2017).

Findings

Findings Regarding the Descriptive Statistics of the Variables

The descriptive statistics regarding the variables are presented below.

Table 1

Descriptive Statistics for Teachers' Levels of Proactive Personality, Digital Literacy, and Innovativeness

Variable	N	M	SD	Min.	Max.	Score Range
Proactive Personality	322	55.93	7.40	27	70	10–70
Digital Literacy	322	57.40	7.60	15	75	15–75
Innovativeness	322	74.72	9.04	49	98	20–100

Note. SD = Standard deviation; Min. = Minimum score; Max. = Maximum score.

When Table 1 is examined, it can be seen that teachers' mean scores for proactive personality ($M = 55.93$, $SD = 7.40$), digital literacy ($M = 57.40$, $SD = 7.60$), and innovativeness ($M = 74.72$, $SD = 9.04$) are relatively high when the possible score ranges of the scales are taken into account.

Findings Regarding the First Research Question

The findings regarding the first research question are presented in turn below.

Table 2

Independent Samples t-Test Results by Gender

Variable	Gender	N	M	SD	t(320)	p
Proactive Personality	Female	184	56.35	7.25	1.157	.248
	Male	138	55.38	7.60		
Digital Literacy	Female	184	57.18	7.51	-0.603	.547
	Male	138	57.70	7.72		
Innovativeness	Female	184	74.32	8.97	-0.922	.357
	Male	138	75.25	9.12		

Note. M = Mean; SD = Standard deviation.

When Table 2 is examined, it was determined that teachers' proactive personality scores did not differ significantly by gender, $t(320) = 1.157$, $p = .248$. Similarly, no significant differences were found between female and male teachers in digital literacy, $t(320) = -0.603$, $p = .547$, or innovativeness scores, $t(320) = -0.922$, $p = .357$.

Table 3

One-Way ANOVA Results by Age

Variable	Age	N	M	SD	F(3, 318)	p	η^2
Proactive Personality	22–30	92	55.74	7.03	0.903	.440	.008
	31–40	118	56.69	6.88			
	41–50	80	54.96	8.90			
	51+	32	56.13	6.10			
Digital Literacy	22–30	92	57.71	7.32	0.201	.895	.002
	31–40	118	57.58	8.14			
	41–50	80	56.99	7.63			
	51+	32	56.88	6.38			
Innovativeness	22–30	92	73.42	9.07	0.898	.442	.008
	31–40	118	75.37	9.34			
	41–50	80	75.09	8.51			
	51+	32	75.09	9.09			

Note. M = Mean; SD = Standard deviation; η^2 = Eta squared.

When Table 3 is examined, it was determined that teachers' proactive personality scores did not differ significantly by age, $F(3, 318) = 0.903$, $p = .440$, $\eta^2 = .008$. Similarly, no significant

differences were found among age groups in digital literacy, $F(3, 318) = 0.201$, $p = .895$, $\eta^2 = .002$, or innovativeness scores, $F(3, 318) = 0.898$, $p = .442$, $\eta^2 = .008$.

Table 4
One-Way ANOVA Results by Professional Seniority

Variable	Seniority (years)	N	M	SD	F(3, 318)	p	η^2
Proactive Personality	1–5	92	55.59	6.48	2.416	.066	.022
	6–10	74	57.91	7.23			
	11–20	83	54.96	7.20			
	20+	73	55.48	8.58			
Digital Literacy	1–5	92	57.89	6.55	1.001	.392	.009
	6–10	74	57.99	9.69			
	11–20	83	56.18	6.95			
	20+	73	57.58	7.10			
Innovativeness	1–5	92	72.73	8.41	2.185	.090	.020
	6–10	74	75.84	10.07			
	11–20	83	75.14	8.52			
	20+	73	75.60	9.03			

Note. M = Mean; SD = Standard deviation; η^2 = Eta squared.

When Table 4 is examined, it was determined that teachers' proactive personality scores did not differ significantly by professional seniority, $F(3, 318) = 2.416$, $p = .066$, $\eta^2 = .022$. Similarly, no significant differences were found among professional seniority groups in digital literacy, $F(3, 318) = 1.001$, $p = .392$, $\eta^2 = .009$, or innovativeness scores, $F(3, 318) = 2.185$, $p = .090$, $\eta^2 = .020$.

Table 5
One-Way ANOVA Results by Tenure at the Current School

Variable	Tenure (years)	N	M	SD	F(3, 318)	p	η^2
Proactive Personality	0–2	138	55.82	6.80	0.438	.726	.004
	3–5	86	56.53	7.36			
	6–9	65	55.20	8.16			
	10+	33	56.30	8.50			
Digital Literacy	0–2	138	57.14	7.83	1.491	.217	.014
	3–5	86	58.12	7.69			
	6–9	65	56.12	6.99			
	10+	33	59.12	7.33			
Innovativeness	0–2	138	74.00	8.77	1.259	.289	.012
	3–5	86	75.13	8.39			
	6–9	65	74.40	10.99			
	10+	33	77.27	7.16			

Note. M = Mean; SD = Standard deviation; η^2 = Eta squared.

When Table 5 is examined, it was determined that teachers' proactive personality, digital literacy, and innovativeness scores did not differ significantly according to tenure at their current school ($p > .05$).

Table 6
One-Way ANOVA Results by School Level

Variable	Level	N	M	SD	F(3, 318)	p	η^2
Proactive Personality	Preschool	30	57.00	5.82	0.736	.531	.007
	Primary School	80	55.70	7.92			
	Middle School	97	55.20	7.70			
	High School	115	56.44	7.15			
Digital Literacy	Preschool	30	55.30	6.74	1.231	.298	.011
	Primary School	80	57.21	7.62			
	Middle School	97	57.25	7.32			
	High School	115	58.21	7.98			
Innovativeness	Preschool	30	75.93	7.13	1.314	.270	.012
	Primary School	80	76.03	9.77			
	Middle School	97	73.55	9.73			
	High School	115	74.48	8.26			

Note. M = Mean; SD = Standard deviation; η^2 = Eta squared.

When Table 6 is examined, it was determined that teachers' proactive personality, digital literacy, and innovativeness scores did not differ significantly according to the school level at which they work ($p > .05$).

Findings Regarding the Second Research Question

The findings regarding the second research question are presented below.

Table 7
Correlation Coefficients Among Variables

Variable	1	2	3
1. Proactive Personality	—		
2. Digital Literacy	.417**	—	
3. Innovativeness	.488**	.342**	—

Note. ** $p < .01$.

When Table 7 is examined, it can be seen that there are positive and significant relationships between proactive personality and digital literacy ($r = .417$, $p < .01$), between proactive

personality and innovativeness ($r = .488$, $p < .01$), and between innovativeness and digital literacy ($r = .342$, $p < .01$).

Findings Regarding the Third Research Question

The findings regarding the third research question are presented below.

Table 8

Multiple Regression Analysis Results

Predictor	B	SE	β	t	p	Tolerance	VIF
Constant	27.152	3.522	—	7.709	< .001	—	—
Proactive Personality	.337	.059	.329	5.722	< .001	.762	1.313
Innovativeness	.152	.048	.181	3.157	.002	.762	1.313

Note. Dependent variable: Digital literacy. $F(2, 319) = 39.628$, $p < .001$. $R^2 = .199$. Durbin-Watson = 2.030. B = unstandardized coefficient; SE = standard error; β = standardized coefficient; VIF = variance inflation factor.

According to Table 8, the regression model is significant, $F(2, 319) = 39.628$, $p < .001$, and explains 19.9% of the variance in digital literacy, $R^2 = .199$. Proactive personality ($\beta = .329$, $p < .001$) and innovativeness ($\beta = .181$, $p = .002$) are significant predictors of digital literacy.

Findings Regarding the Fourth Research Question

The findings regarding the fourth research question are presented below.

Table 9

Mediation Analysis Results

Type of Effect	β	B	Boot SE	Boot LLCI	Boot ULCI
Total Effect (c)	.417	.428	—	—	—
Direct Effect (c')	.329	.337	.059	.221	.453
Indirect Effect (via Innovativeness)	.089	.091	.032	.032	.159

Note. LLCI = Lower limit confidence interval; ULCI = Upper limit confidence interval; Boot SE = Bootstrap standard error. The indirect effect is significant when the 95% confidence interval does not contain zero.

When Table 9 is examined, it can be seen that the total effect of proactive personality on digital literacy is significant, $\beta = .417$, $p < .001$. Bootstrap results show that innovativeness has a significant indirect effect, $\beta = .089$, 95% CI [.032, .159]. Accordingly, innovativeness plays a partial mediating role in the relationship between proactive personality and digital literacy.

Discussion

In this study, the relationships among teachers' proactive personality, innovativeness, and digital literacy were examined. In addition, the study investigated whether these variables differed according to various demographic characteristics, whether proactive personality and innovativeness predicted digital literacy, and whether innovativeness mediated the relationship between proactive personality and digital literacy. Overall, the findings indicated that teachers reported relatively high levels of proactive personality, innovativeness, and digital literacy. These variables did not differ significantly according to gender, age,

professional seniority, tenure at the current school, or school level. Furthermore, positive and significant relationships were found among the three variables. The findings also demonstrated that proactive personality and innovativeness were significant predictors of digital literacy and that innovativeness partially mediated the relationship between proactive personality and digital literacy.

The relatively high levels of teachers' proactive personality, digital literacy, and innovativeness suggest that teachers are generally willing to adapt to change, adopt new practices, and use digital technologies in their professional practice. This finding is consistent with Ertürk (2023), who reported high levels of proactive behavior and innovative work behavior among teachers. Similarly, Çapraz (2023) and Özkurt (2022) found that teachers demonstrated above-average levels of digital literacy and individual innovativeness. In contemporary educational settings, teachers are expected not only to apply their existing knowledge and skills but also to adapt to changing educational environments, keep pace with emerging technologies, and continuously improve their teaching practices. From this perspective, the present findings suggest that teachers possess the personal characteristics needed to meet these professional expectations.

No significant differences were found in teachers' proactive personality, innovativeness, or digital literacy according to gender, age, professional seniority, tenure at the current school, or school level. The absence of gender differences is consistent with the findings of Uygun (2023) and Ertürk (2023) regarding proactive personality, as well as those of Kılıç and Ayvaz Tuncel (2014) regarding innovativeness. Although previous studies have reported mixed findings regarding gender differences in digital literacy, Küslü (2022) and Gökbulut (2021) likewise found no significant differences. This finding suggests that teachers' engagement with digital technologies and their innovative tendencies are no longer strongly influenced by gender. Increased access to educational technologies and the widespread integration of digital tools into teaching may have contributed to reducing the gender-based differences reported in earlier studies.

A similar pattern was observed for age and professional seniority. The absence of significant differences across age groups supports the findings of Ertürk (2023). In contrast, Uygun (2023) reported that younger teachers demonstrated higher levels of proactive personality. Likewise, the findings regarding professional seniority are consistent with those reported by Ertürk (2023) and Kılıç and Ayvaz Tuncel (2014). The lack of significant differences in the present study may reflect the fact that digital transformation and innovation have become common professional expectations for teachers regardless of their years of experience. In addition, the widespread use of digital technologies in education and the increased availability of in-service professional development opportunities may have reduced differences across age and seniority groups.

No significant differences were found with respect to teachers' tenure at their current school. This finding differs from that of Ertürk (2023), who reported that proactive behavior and innovative work behavior increased with longer tenure at the same school. This discrepancy may reflect the influence of contextual factors such as school culture, leadership practices, and organizational climate. Likewise, no significant differences were found according to school level. This finding suggests that proactive personality, innovativeness, and digital literacy are not characteristics unique to a particular educational level. In contemporary educational settings, teachers at all levels, from preschool to secondary education, are expected to use digital technologies effectively, adopt innovative teaching practices, and

adapt to educational change. Therefore, it is not surprising that these characteristics were observed at similar levels across different school levels.

An important finding of the study is the positive and significant relationships among proactive personality, innovativeness, and digital literacy. The relationship between proactive personality and innovativeness is consistent with previous research. Pan et al. (2021), Siregar et al. (2026), and Ertürk (2023) identified proactive personality as an important antecedent of innovative behavior. According to Bateman and Crant (1993), proactive individuals actively seek to change their environment and are therefore more willing to adopt and implement new ideas. The present findings likewise suggest that teachers with stronger proactive personality traits are more open to innovative practices. Similarly, Aabbasian and Hassani (2025) reported that teachers' proactive personality significantly predicted their innovativeness. Likewise, Özdemir (2023) found that, based on teachers' perceptions, shared responsibility and proactive agility were strongly associated with innovation management ($r = .72, p < .01$) and significantly predicted innovation management ($\beta = .60$).

The positive relationship between innovativeness and digital literacy supports the findings of Özkurt (2022) and Ocak and Kuş Serin (2024). Individuals with stronger innovative tendencies are generally more willing to experiment with new practices and may therefore be more motivated to learn and use digital technologies. Rogers' (2003) Diffusion of Innovations Theory also emphasizes that individual characteristics play a key role in the adoption of innovations. From this perspective, innovativeness appears to strengthen teachers' willingness to adopt digital technologies and integrate them into their teaching practices.

The positive relationship between proactive personality and digital literacy is another important finding of the present study. This finding is consistent with Ozkan-Hidiroglu et al. (2021), who reported a positive relationship between technology literacy and proactive personality. Individuals with proactive personality traits are more likely to recognize opportunities, seek new knowledge, and adapt to changing conditions, all of which may contribute to the development of digital literacy. Likewise, the theoretical perspectives proposed by Crant (2000) and Parker et al. (2006) suggest that proactive individuals participate more actively in learning and professional development processes.

The regression analysis showed that proactive personality and innovativeness together explained approximately 20% of the variance in digital literacy. This finding suggests that digital literacy is influenced not only by technical knowledge and skills but also by individual characteristics and innovative tendencies. Explaining approximately one-fifth of the variance indicates that proactive personality and innovativeness are important psychological determinants of digital literacy. At the same time, the relatively modest proportion of explained variance highlights the multidimensional nature of digital literacy. Indeed, Ng (2012) and Falloon (2020) describe digital literacy as a complex construct that encompasses cognitive, technical, social, and pedagogical dimensions. Accordingly, other factors, such as self-efficacy, technological infrastructure, administrative support, professional development opportunities, and attitudes toward technology, are also likely to influence teachers' digital literacy.

The most notable finding of the study is that innovativeness partially mediated the relationship between proactive personality and digital literacy. The findings indicate that proactive personality influences digital literacy not only directly but also indirectly through innovativeness. In other words, teachers with stronger proactive personality traits are more

likely to develop an innovative orientation by actively seeking opportunities and leading change, which, in turn, contributes to higher levels of digital literacy. These findings suggest that proactive personality enhances digital literacy both directly and indirectly by fostering teachers' innovativeness. This highlights that the development of digital literacy depends not only on an individual's tendency to initiate change but also on the extent to which this tendency is translated into innovative behavior. As no previous study has directly examined this mediating mechanism, the present findings provide a novel contribution to the literature.

From a theoretical perspective, these findings are consistent with Rogers' (2003) emphasis on the role of individual characteristics in the adoption of innovations. Likewise, the findings of Pan et al. (2021) regarding the influence of proactive personality on innovative behavior and those of Bozbayındır and Alev (2018) concerning the relationship between proactive personality and openness to change support the proposed mechanism. However, the present study extends this literature by demonstrating that the relationship between proactive personality and digital literacy is explained not only by a direct effect but also through innovativeness. These findings suggest that digital literacy is associated not only with technical skills or access to technology but also with individuals' innovative tendencies. Accordingly, innovativeness can be regarded as an important psychological mechanism through which proactive personality contributes to the development of digital literacy.

Conclusion

Overall, the findings demonstrate significant and mutually reinforcing relationships among teachers' proactive personality, innovativeness, and digital literacy. In particular, the mediating role of innovativeness suggests that focusing exclusively on technical skills is insufficient to support teachers' digital transformation. Efforts to enhance teachers' digital literacy should also create learning environments that foster innovative thinking and proactive behavioral tendencies. Accordingly, in-service professional development programs should extend beyond technology training to include activities that promote innovative thinking, problem-solving, entrepreneurship, and change management skills. Such an approach may help teachers become not only effective users of technology but also active agents of educational change who bring innovation into their classrooms.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

The authors declare that an AI-assisted language tool was used during the writing process of the article for the purposes of translating the text and correcting spelling/grammatical errors. This use was limited solely to language translation and the correction of spelling and grammatical errors.

References

- Aabbasian, Z., & Hassani, M. (2025). The role of proactive personality in promoting innovative work behavior and creativity: A study of the mediation of intrinsic motivation and thriving at work in teachers. *School Administration*, 13(1), 83–95.
- Agarwal, R., & Prasad, J. (1998). A conceptual and operational definition of personal innovativeness in the domain of information technology. *Information Systems Research*, 9(2), 204–215. <https://doi.org/10.1287/isre.9.2.204>
- Akın, A., & Arıcı Özcan, N. (2015). Short Turkish version of proactive scale: A study of validity and reliability. *Mevlana International Journal of Education*, 5(1), 165–172.
- Bateman, T. S., & Crant, J. M. (1993). The proactive component of organizational behavior: A measure and correlates. *Journal of Organizational Behavior*, 14(2), 103–118. <https://doi.org/10.1002/job.4030140202>
- Bozbayındır, F., & Alev, S. (2018). Öğretmenlerin öz yeterlilik, proaktif kişilik ve değişime açıklık algıları arasındaki ilişkinin incelenmesi [Examining the relationship between teachers' self-efficacy, proactive personality, and openness to change perceptions]. *İnönü Üniversitesi Eğitim Fakültesi Dergisi*, 19(2), 293–311. <https://doi.org/10.17679/inuefd.346666>
- Büyüköztürk, Ş., Akgün, Ö. E., Demirel, F., Karadeniz, Ş., & Çakmak, E. K. (2015). *Bilimsel araştırma yöntemleri* [Scientific research methods].
- Çapraz, Y. (2023). Okul müdürlerinin dijital liderlik davranışlarının öğretmenlerin dijital okuryazarlık yeterlilikleri ve bireysel yenilikçilik düzeyleri ile ilişkisi [The relationship between school principals' digital leadership behaviors and teachers' digital literacy competencies and individual innovativeness levels] (Thesis No. 805634) [Unpublished master's thesis, Eskişehir Osmangazi University].
- Crant, J. M. (2000). Proactive behavior in organizations. *Journal of Management*, 26(3), 435–462. <https://doi.org/10.1177/014920630002600304>
- Darling-Hammond, L. (2006). *Powerful teacher education: Lessons from exemplary programs*. Jossey-Bass.
- Ertürk, R. (2023). Öğretmenlerin proaktif davranışları ile yenilikçi iş davranışları arasındaki ilişki [The relationship between teachers' proactive behaviors and innovative work behaviors]. *Bolu Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, 23(4), 2142–2159. <https://doi.org/10.17240/aibuefd.2023..-1327252>
- Eshet-Alkalai, Y. (2004). Digital literacy: A conceptual framework for survival skills in the digital era. *Journal of Educational Multimedia and Hypermedia*, 13(1), 93–106.
- Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research and Development*, 68(5), 2449–2472. <https://doi.org/10.1007/s11423-020-09767-4>

- Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Duckworth, D. (2020). *Preparing for life in a digital world: IEA International Computer and Information Literacy Study 2018 international report*. Springer. <https://doi.org/10.1007/978-3-030-38781-5>
- Gilster, P. (1997). *Digital literacy*. Wiley.
- Gökbulut, B. (2021). Öğretmenlerin dijital okuryazarlık düzeyleri ile hayat boyu öğrenme eğilimlerinin incelenmesi [Examining the relationship between teachers' digital literacy levels and lifelong learning tendencies]. *Yükseköğretim ve Bilim Dergisi*, 11(3), 469–479. <https://doi.org/10.5961/jhes.2021.466>
- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Publications.
- Hurt, H. T., Joseph, K., & Cook, C. D. (1977). Scales for the measurement of innovativeness. *Human Communication Research*, 4(1), 58–65. <https://doi.org/10.1111/j.1468-2958.1977.tb00597.x>
- Kılıç, H., & Ayvaz Tuncel, Z. (2014). Sınıf öğretmenlerinin bireysel yenilikçilik düzeyleri ve yaşam boyu öğrenme eğilimleri arasındaki ilişki [The relationship between classroom teachers' individual innovativeness levels and lifelong learning tendencies]. *İlköğretim Online*, 13(2), 168–183.
- Kılıçer, K., & Odabaşı, H. F. (2010). Bireysel yenilikçilik ölçeği (BYÖ): Türkçeye uyarlama, geçerlik ve güvenirlik çalışması [Individual Innovativeness Scale (IIS): Adaptation to Turkish, validity and reliability study]. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 38, 150–164.
- Kukal, S., & Töre, E. (2024). Okul yöneticilerinin proaktif kişilik özellikleri ile teknoloji liderliği öz-yeterlilikleri arasındaki ilişki [The relationship between school administrators' proactive personality traits and technology leadership self-efficacy]. *Kocaeli Üniversitesi Eğitim Dergisi*, 7(2), 481–512.
- Küslü, F. (2022). Öğretmenlerin eleştirel dijital okuryazarlık becerilerinin çeşitli değişkenler açısından incelenmesi [Examining teachers' critical digital literacy skills in terms of various variables] [Unpublished doctoral dissertation, Anadolu University].
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065–1078. <https://doi.org/10.1016/j.compedu.2012.04.016>
- Ocak, G., & Kuş Serin, B. (2024). Öğretmenlerin bireysel yenilikçilik ve dijital okuryazarlık düzeylerinin bilişim teknolojileri kullanım düzeylerini yordama gücü [The predictive power of teachers' individual innovativeness and digital literacy levels on their information technology usage levels]. *Anadolu Journal of Educational Sciences International*, 14(1), 147–169.
- Özdemir, G. (2023). The relationship between school administrators' agile leadership and their innovation management competencies. *International Journal of Education & Literacy Studies*, 11(1), 175–184. <https://doi.org/10.7575/aiac.ijels.v.11n.1p.175>

- Özden, M., Meydan, E., & Günay, G. (2024). Dijital okuryazarlık becerisi ölçeği: Güvenirlik ve geçerlik çalışması [Digital literacy skill scale: A reliability and validity study]. *Eğitimde Kuram ve Uygulama*, 20(1), 38–48.
- Ozkan Hidiroglu, Y., Hidiroglu, C. N., & Tanriogen, A. (2021). The relationship between technology literacies and proactive personalities of secondary school mathematics teachers. *International Journal of Technology in Education and Science*, 5(1), 91–100.
- Özkurt, L. (2022). Okul öncesi öğretmenlerinin dijital okuryazarlık ile bireysel yenilikçilik düzeyleri arasındaki ilişkinin incelenmesi [Examining the relationship between preschool teachers' digital literacy and individual innovativeness levels] (Thesis No. 725134) [Unpublished master's thesis, Hasan Kalyoncu University].
- Pan, B., Song, Z., & Wang, X. (2021). The impact of proactive personality on innovative behavior among preschool teachers: The mediating role of self-efficacy. *Frontiers in Psychology*, 12, Article 734484. <https://doi.org/10.3389/fpsyg.2021.734484>
- Parker, S. K., Williams, H. M., & Turner, N. (2006). Modeling the antecedents of proactive behavior at work. *Journal of Applied Psychology*, 91(3), 636–652. <https://doi.org/10.1037/0021-9010.91.3.636>
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
- Schleicher, A. (2018). *World class: How to build a 21st-century school system*. OECD Publishing.
- Siregar, J., Widodo, W., Permana, R., Sriyono, H., & Saputro, A. (2026). Evoking teachers' innovative work behavior: Perspective of digital leadership, creativity, and proactive personality through work engagement. *European Journal of Educational Research*, 15(1), 323–339. <https://doi.org/10.12973/eu-jer.15.1.323>
- Uygun, H. (2023). Öğretmenlerin proaktif kişilik özellikleri, mesleki doyumları ve psikolojik iyi oluş düzeyleri arasındaki ilişki [The relationship between teachers' proactive personality traits, job satisfaction, and psychological well-being levels] [Unpublished master's thesis, Dicle University].
- Yi, M. Y., Jackson, J. D., Park, J. S., & Probst, J. C. (2006). Understanding information technology acceptance by individual professionals: Toward an integrative view. *Information & Management*, 43(3), 350–363. <https://doi.org/10.1016/j.im.2005.08.006>

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