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Original scientific paper
UDC: 371.14:159.923
<http://doi.org/10.5937/IstrPed2601001Y>

PREDICTING TEACHER CANDIDATES' PROFESSIONAL INNOVATIVENESS TENDENCIES: THE ROLE OF GENDER, ACHIEVEMENT GOALS, AND ENTREPRENEURSHIP⁴


Abstract: This study aims to test whether gender, achievement goals, and entrepreneurship are significant predictors of teacher candidates' tendencies toward professional innovativeness. The research was conducted using a correlational survey model. A total of 351 teacher candidates participated in the study. Data were analyzed using hierarchical multiple regression analysis. The findings indicate that being female is a significant predictor of innovativeness on its own. Mastery goals positively and significantly predict teacher candidates' tendencies toward professional innovativeness, whereas performance-approach and performance-avoidance goals do not show predictive power. The subdimensions of entrepreneurship, as a block, positively and significantly predict professional innovativeness tendencies. At the subdimensions level, only opportunity recognition and emotional intelligence make a unique and significant contribution to explaining professional innovativeness tendencies.

Keywords: Achievement goals; emotional intelligence; entrepreneurship; innovativeness; opportunity recognition.

1. Introduction

Given the increased competition between institutions (Akay & Cetin Gurkan, 2021), the shift from traditional to contemporary educational philosophies (Tas, 2017), and the individual and cultural differences in the areas where teaching will be practiced—along with the potential disadvantages these differences may bring (Ozer et al., 2023)—it is essential that teachers continually update their professional knowledge, skills, attitudes, and values. Even teacher candidates who graduate with robust preparation can easily fall behind if they don't continue to grow and acquire new insights (Altıntaş Yuksel & Gelisli, 2018). Teachers who lack an innovative mindset may struggle to play an effective role in implementing educational system changes or in meeting the evolving perspectives and processes demanded by current conditions (Akca & Sakar, 2017). Instead, these teachers may inadvertently reinforce a status quo-centered educational approach (Kocasarac, 2021). To prevent this, it may be valuable to identify factors that influence teacher candidates' tendencies toward professional innovativeness, allowing teacher training programs to be designed to foster a stronger inclination toward innovation.

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⁴ This study was funded by The Scientific and Technological Research Council of Türkiye (TÜBİTAK) under the 2209-A Research Project Support Program for Undergraduate Students.

This study focuses on examining key variables believed to impact teacher candidates' professional innovativeness, specifically gender, entrepreneurship, and achievement goals. Each variable was explored individually, and hypotheses were formulated based on existing research examining relationships among these factors.

1.1. Innovativeness

The concepts of innovation and innovativeness are related but signify different processes and situations. Innovation refers to ideas, practices, processes, services, products, situations, and phenomena that are new or have positive connotations for society, often being distinct from previous instances or introduced for the first time (Kocasarac, 2021; Yuceer & Tumkaya, 2024). Innovativeness, however, concerns how quickly these innovations are adopted, internalized, approached, and to what extent individuals engage with them (McGeown, 1980). As noted by Xia and O'Shea (2024), innovativeness can be considered the enacted and lived version of innovation. From this perspective, innovation represents objective, individual-independent phenomena, whereas innovativeness embodies subjective reactions of individuals toward these phenomena.

Being innovative offers various advantages. Innovative individuals tend to solve problems more easily (Vatansever Bayraktar & Karabulut, 2020), feel psychologically better (Ikiz & Asici, 2017), and have higher learning motivation (Law & Breznik, 2017). In the teaching profession, innovative teachers demonstrate better performance in teacher leadership, collaboration with colleagues, theoretical advancement, and professional development (Akin Kosterelioglu & Demir, 2014). They are better equipped to fulfill their roles and competencies in online settings (Nayci, 2021) and exhibit greater self-efficacy in remote learning, as well as enhanced inquiry and practice (Vidergor, 2023). In the classroom, they create more creative and constructivist learning environments (Ucus & Acar, 2018). Such educators are also more inclined toward lifelong learning (Yilmaz & Beskaya, 2018).

1.2. Entrepreneurship

Entrepreneurship can be defined as the willingness to pursue opportunities regardless of the resources currently controlled (Stevenson & Jarillo, 2007). Entrepreneurial individuals are distinguished from others by their sense of responsibility and internal locus of control (Beugelsdijk, 2007). Another defining feature of entrepreneurial individuals is their creativity. They actively seek opportunities to use their creativity and make a difference (Wathanakom et al., 2020). They do not wait for opportunities to come to them; instead, they discover or even create opportunities when necessary, increasing their chances of survival (Corrêa et al., 2022). Entrepreneurship is not only about individual gains. Entrepreneurial individuals, while improving their own life conditions, also become driving forces of technological, social, and economic progress for their families, institutions, communities, and even nations (Leković & Marić, 2016).

1.3. Achievement Goals

Achievement goals refer to the reasons for engaging in an achievement task (Was, 2006). Achievement Goal Theory (AGT) seeks to explain how an individual's learning motivation and the direction of this motivation impact learning outcomes (Dawe, 2020). This theory focuses on the reasons why students become personally invested in certain tasks and asserts that these motivations are related to students' achievements, emotional responses, beliefs about the nature of intelligence, and the social contexts they are part of (Anderman & Patrick, 2012). Centered on the concept of competence, AGT posits that motivation is a process, goals are accessible and consciously recognized cognitive representations that form motivational systems, and these systems are intertwined with self-related processes (Maehr & Zusho, 2009; Pintrich, 2000).

Achievement goals consist of various orientations that individuals may prefer (Senko et al., 2011), generally divided into mastery goals, which define competence in absolute or intrinsic terms, and performance goals, which define competence in normative or extrinsic terms (Elliot & McGregor, 2001). Mastery goals promote seeking challenges, increasing effort, and facilitating learning outcomes, whereas performance goals reflect a desire to demonstrate competence by outperforming others or achieving success with less effort (Senko, 2016). Mastery goals are associated with intrinsic motivation, self-regulated learning, and deep learning, whereas performance goals do not share these associations (Halvari et al., 2011).

Both mastery and performance goals can be further categorized into approach and avoidance orientations. Students with mastery-approach goals focus on understanding course material, overcoming challenges, or improving their competencies, while those with performance-approach goals seek to display their abilities relative to others or publicly validate their self-worth (Zusho & Clayton, 2011). Thus, mastery-approach-oriented students strive to surpass themselves, whereas performance-approach-oriented students aim to outperform others (Linnenbrink & Pintrich, 2002). Mastery-avoidance goals involve avoiding tasks that elicit feelings of incompetence (Chazan et al., 2022). In mastery-avoidance goals, the desire to master a skill turns into a fear of not mastering it (Dawe, 2020). Performance-avoidance goals are conceptualized as self-regulation goals aimed at avoiding actions that may lead to negative evaluations of one's abilities (Elliot & Harackiewicz, 1996). Students who adopt performance-avoidance goals refrain from actions that might expose their weaknesses (Zhou, 2021).

1.4. Gender and Professional Innovativeness

Studies examining the relationship between gender and innovativeness largely focus on individual innovativeness, professional innovativeness, and the characteristics of innovative teachers. Research on individual innovativeness generally shows no significant differences based on gender (Akca & Sakar, 2017; Alagoz et al., 2019; Bautista et al., 2018; Kilic, 2015; Yilmaz & Beskaya, 2018). However, some studies reveal that, while many subdimensions do not show significant differences, men are more likely to take risks, whereas women tend to be more resistant to change in specific areas of individual innovativeness (Atilgan & Tukul, 2021; Manbaki, 2023). In another study by Mulhim (2018), while most dimensions did not show significant gender differences, women were found to be more innovative in the area of opinion leadership. Similarly, Gokbulut (2021) found no significant gender differences in terms of being skeptical, inquisitive, or pioneering, yet men were more innovative overall. These findings suggest that individual innovativeness, at least in total score terms, is generally unaffected by gender, though occasional differences favor men or women in specific subdimensions.

When focusing on professional innovativeness, the findings are more varied. Some studies indicate that innovative teacher characteristics do not differ significantly by gender (Vatansever Bayraktar & Karabulut, 2020; Veysanoglu & Kaplan, 2023), while others suggest that women exhibit more characteristics associated with innovative teaching (Kocasarac, 2021; Tekcan & Gecer, 2022). Similarly, research specifically addressing professional innovativeness often reports higher and more positive scores for female teachers (Uzundal, 2021; Yilmaz et al., 2014; Yuceer & Tumkaya, 2024). This suggests that being female may positively and significantly predict professional innovativeness.

H₁: Being female can positively and significantly predict professional innovativeness tendency.

1.5. Achievement Goals and Professional Innovativeness

As Alexander and Van Knippenberg (2014) pointed out, AGT, which emphasizes orientations toward achieving success or avoiding failure, is useful for understanding the underlying mechanisms of innovation processes. In this context, Cai and Wen (2018) found a positive relationship between

mastery and performance-approach goals and innovative behavior, but a negative relationship between performance-avoidance goals and innovativeness. Similarly, Zhou (2021) determined that mastery goals and performance-approach goals positively impact innovativeness, while performance-avoidance goals negatively affect it. Wang et al. (2021) showed that both mastery goals and performance-approach goals are related to an innovative cognitive style, whereas performance-avoidance goals are not. On the other hand, Gorozidis and Papaioannou (2016) found that neither performance-approach nor performance-avoidance goals were effective predictors of innovativeness; only mastery goals had a positive predictive relationship. Another study revealed that leaders with performance goals tended to resist radically creative ideas associated with innovation, while those with mastery goals more readily embraced them (Sijbom et al., 2015). Overall, the literature consistently supports a positive relationship between mastery goals and innovativeness, while the relationship between performance goals and innovativeness is less clear. Performance-approach goals have sometimes shown a positive effect and other times no effect, while performance-avoidance goals have been either ineffective or negatively impactful. Based on these findings, the following hypotheses are proposed:

H_{2a}: Mastery goals can positively and significantly predict professional innovativeness tendency.

H_{2b}: Performance-approach goals can positively and significantly predict professional innovativeness tendency.

H_{2c}: Performance-avoidance goals can negatively and significantly predict professional innovativeness tendency.

1.6. Entrepreneurship and Professional Innovativeness

A review of the literature reveals numerous studies exploring the relationship between entrepreneurship and innovativeness. Some research suggests a reciprocal relationship between entrepreneurship and innovativeness (Huang et al., 2022), while other studies consider innovativeness as a dimension of entrepreneurship, asserting that innovation is essential for entrepreneurial orientation (Hernández-Perlines et al., 2020). This raises the possibility that innovativeness could predict entrepreneurship. Indeed, Tu et al. (2021) found that graduate students' levels of innovativeness significantly influenced their social entrepreneurship intentions. Similarly, another study found that innovative teacher candidates were more likely to exhibit social entrepreneurship characteristics (Gur-Erdogan et al., 2014). According to Gozukara and Colakoglu (2016), innovativeness positively affects entrepreneurial intentions. Wathanakom et al. (2020) also provided evidence that innovativeness effectively predicts entrepreneurial intentions among undergraduate students.

Although the aforementioned studies often present innovation as a predictor and entrepreneurship as a predicted variable, there is also an argument suggesting that entrepreneurship may be necessary to initiate innovation (Leković & Marić, 2016), implying a possible reverse relationship. Supporting this idea, some studies indicate that entrepreneurial curiosity positively influences innovativeness (Peljko et al., 2016). An entrepreneurial attitude promotes the development of highly original new products (Avlonitis & Salavou, 2007), and entrepreneurial intentions can positively predict individual innovativeness (Ugwueze et al., 2022).

Entrepreneurship fosters innovativeness not only at the individual level but also at the institutional level (Tajeddini, 2010). Entrepreneurial competencies within organizations facilitate the establishment and performance of innovations (Kyrgidou & Spyropoulou, 2013), enhancing the organization's competitive edge through technological advancements (Scuotto et al., 2020). The evidence from both individual and institutional studies suggests that entrepreneurship may positively predict professional innovativeness. Based on this understanding, the following hypothesis is developed:

H₃: Entrepreneurship can positively and significantly predict professional innovativeness.

2. Methods

2.1. Research Model

This study utilized a correlational survey model, which is commonly employed to identify relationships between variables and the extent of these relationships (Karasar, 2012). Within this framework, the research focused on variables hypothesized to predict professional innovativeness and tested five distinct models. The tested model is presented in Figure 1.

As shown in Figure 1, the first model focuses on determining the effect of gender as a predictor variable for professional innovativeness tendency. Subsequent models were progressively expanded to include mastery goals, performance-approach goals, performance-avoidance goals, and subdimensions of entrepreneurship. The decision to begin modeling with gender stems from its status as a demographic variable that remains constant over time and across environments. As the models evolved, the impact of gender was examined to reveal the primary effects of other variables that may be influenced by time and context. The inclusion of mastery-approach and mastery-avoidance goals as a block in the second model was based on the literature, which suggests both variables can positively impact innovativeness and that mastery goals are often considered a single dimension in achievement goal theory's trichotomous model (Elliot & McGregor, 2001). In the third and fourth models, performance goals were entered separately as performance-approach and performance-avoidance goals. This approach acknowledges that while the literature sometimes indicates similar effects for both orientations, negative effects are primarily associated with performance-avoidance goals, warranting the testing of alternative models (Elliot & Harackiewicz, 1996). Finally, subdimensions of entrepreneurship were added as a block to determine whether entrepreneurship continues to drive innovativeness when all variables are controlled (Leković & Marić, 2016).

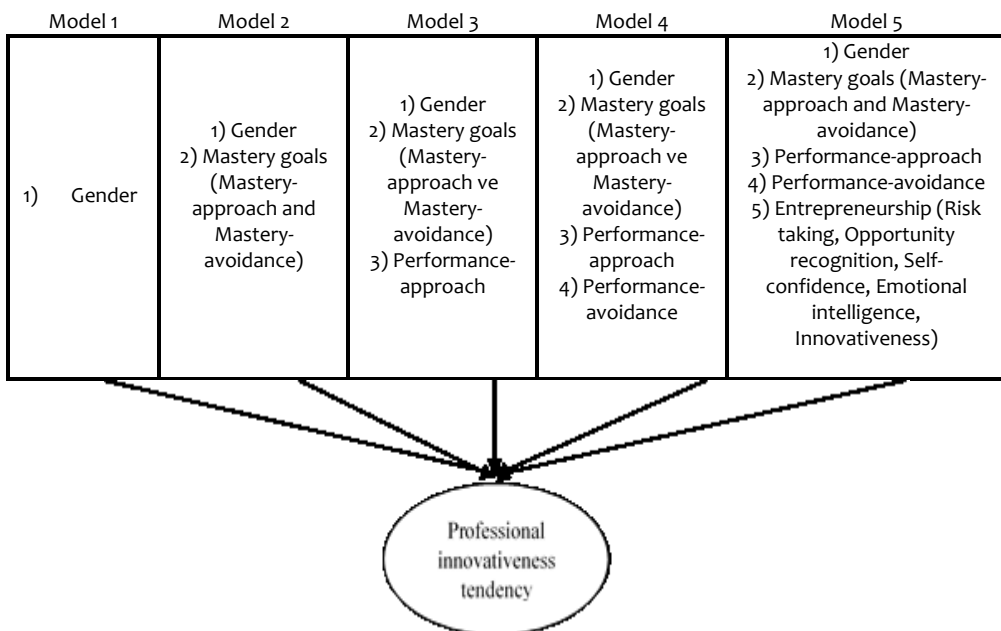


Figure 1. Models tested in the research

2.2. Procedures and Sample

The study sample consisted of 351 teacher candidates enrolled in a university in Türkiye. Table 1 presents the demographic information of the participants.

Table 1. Demographic Information of the Participants

Variable	Observations	f	%
Gender	Female	95	27,1
	Male	256	72,9
Grade	Freshman	95	27,1
	Sophomore	91	25,9
	Junior	79	22,5
	Senior	86	24,5
Department	Primary Education	135	38,5
	Social Studies and Turkish Education	42	12,0
	Mathematics and Science Education	65	18,5
	Fine Arts Education	41	11,7
	Foreign Language Education	68	19,4
	Total	351	100,0

As shown in Table 1, the proportion of male teacher candidates was higher than that of female candidates. The study included a balanced representation from all grade levels. When examined by department, the highest participation was from the primary education department.

2.3. Measures

The instruments used in this study included the Professional Innovativeness Tendencies Scale for Teacher Candidates, the 2x2 Achievement Goals Scale, and the Entrepreneurship Scale for Teacher Candidates.

The Professional Innovativeness Tendencies Scale for Teacher Candidates is a single-dimensional, 5-point Likert scale. In the original study, exploratory factor analysis (EFA) results indicated that the factor loadings of 25 items ranged from 0.372 to 0.785. The scale explained 33.12% of the total variance in its current form (Yilmaz, 2014).

The 2x2 Achievement Goals Scale, developed by Elliot and Murayama (2008) and adapted into Turkish by Arslan and Akin (2015), is a 12-item, 5-point Likert scale comprising four dimensions: mastery-approach (MAp), mastery-avoidance (MAv), performance-approach (PAp), and performance-avoidance (PAv). The confirmatory factor analysis (CFA) for the four-dimensional model showed good fit indices: $\chi^2 = 172.08$, $df = 48$, $RMSEA = .076$, $NNFI = .97$, $NFI = .98$, $CFI = .98$, $IFI = .98$, $RFI = .96$, $GFI = .94$, and $SRMR = .048$, indicating a well-fitting model.

The Entrepreneurship Scale for Teacher Candidates, developed by Deveci and Cepni (2015), consists of 38 items on a 5-point Likert scale, with five subdimensions: risk-taking (RT), opportunity recognition (OpR), self-confidence (S-c), emotional intelligence (EI), and innovativeness (I). EFA results from the original study showed factor loadings above .50. CFA yielded $NFI = .94$, $NNFI = .96$, $CFI = .96$, $RMR = .063$, and $SRMR = .055$, with an $RMSEA$ of .061, indicating good fit indices. The reliability coefficients of the scales used in the study are presented in Table 2.

Table 2. Measurement Reliability

Scale	Sub-factors	Cronbach's Alpha	Number of items
Professional Innovativeness Tendencies	-	.97	25
Entrepreneurship	Risk taking	.64	7
	Opportunity recognition	.82	9
	Self-confidence	.65	7
	Emotional intelligence	.72	8
	Innovativeness	.77	7
2x2 Achievement Goals	Mastery-approach	.88	3
	Mastery-avoidance	.79	3
	Performance-approach	.89	3
	Performance-avoidance	.86	3

As shown in Table 2, the Cronbach's alpha values for the Professional Innovativeness Tendencies Scale and the opportunity recognition, emotional intelligence, and innovativeness subscales of the Entrepreneurship Scale, as well as for the mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance subscales of the 2x2 Achievement Goals Scale, were above .70, indicating acceptable reliability. The risk-taking and self-confidence subscales of the Entrepreneurship Scale had Cronbach's alpha values below .70 but were considered reliable since both subscales contained fewer than 10 items, and their alpha values exceeded .60 (Sipahi et al., 2010).

2.4. Data Analysis

Hierarchical multiple regression analysis was used to analyze the data and determine the independent effects of each variable in the models. Before conducting the analysis, assumptions related to sample size, multicollinearity, singularity, univariate and multivariate outliers, univariate and multivariate normality, linearity, and independence of residuals were tested (Pallant, 2007). According to Tabachnick and Fidell (2013), the sample size for regression analysis should be at least 50 plus eight times the number of predictor variables. With 10 predictor variables and a sample size of 351, the requirement of having more than 130 participants [(8x10) + 50] was met. Pallant (2007) notes that multicollinearity should not be an issue if the correlation coefficients between predictor variables are below .90. Pearson correlation coefficients between gender, entrepreneurship subdimensions, and achievement goal subdimensions are shown in Table 3.

Table 3. Correlations Among Independent Variables

		Gender	RT	OpR	S-c	EI	I	MAp	MAv	PAP
Entrepreneurship	RT	.03								
	OpR	.06	.56**							
	S-c	.07	.49**	.64**						
	EI	.08	.47**	.59**	.64**					
	I	.04	.42**	.54**	.47**	.56**				
Achievement Goals	MAp	.09	.38**	.52**	.52**	.42**	.37**			
	MAv	.10	.39**	.48**	.50**	.43**	.37**	.70**		
	PAP	.05	.30**	.41**	.44**	.38**	.42**	.48**	.50**	
	PAV	.11*	.28**	.38**	.37**	.34**	.37**	.45**	.55**	.73**

* p<0.05; ** p<0.001

According to the correlation coefficients shown in Table 3, gender exhibited a low, positive, and significant correlation only with performance-avoidance and showed no relationship with any other independent variable. All other independent variables displayed low to moderate, positive, and significant correlations with each other (0.00 < r < 0.70). However, none of the included independent variables had a high correlation coefficient of .90 or above, indicating that

multicollinearity is not a concern in this study. Furthermore, VIF values ranged from 1.02 to 2.38, and Tolerance values ranged from .42 to .98, confirming the absence of multicollinearity, as VIF values were below 10 and Tolerance values were above .10 (Pallant, 2007). Additionally, since professional innovativeness tendencies were included in the analysis as overall scale scores and entrepreneurship and 2x2 achievement goals scales were included as subscale scores, the assumption of singularity was satisfied.

Boxplots were used to identify univariate outliers. Figures 2 illustrates the boxplots before and after removing outliers.

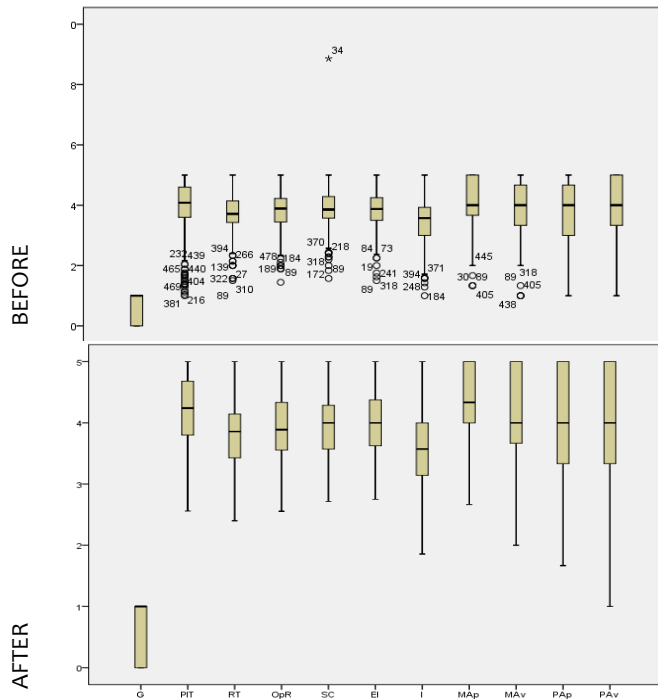


Figure 2. Boxplot of Outliers

Figure 2 shows numerous outliers in variables such as professional innovativeness tendency, risk-taking, opportunity recognition, self-confidence, emotional intelligence, innovativeness, mastery-approach, and mastery-avoidance. Outliers were removed iteratively until none remained, as shown in the “after” section of Figure 2, thereby satisfying the assumption of no univariate outliers. Multivariate outliers were examined using Mahalanobis distance. For 11 variables, the maximum acceptable Mahalanobis distance is 31.26 (Pallant, 2007). The observed Mahalanobis distance ranged from 2.40 to 22.79, indicating no multivariate outliers. Univariate normality was assessed by examining skewness and kurtosis values for each variable using SPSS. Table 4 presents these values:

Table 4. Univariate Normality

Variable	Sub-factor	Skewness	Kurtosis
Professional innovativeness tendency	-	-.59	-.31
Gender (Dummy variable)	Being female	-1.04	-.93
Entrepreneurship	Risk taking	.12	-.25
	Opportunity recognition	.08	-.45
	Self-confidence	-.06	-.62

	Emotional intelligence	-.01	-.59
	Innovativeness	.09	-.45
Achievement Goals	Mastery-approach	-.41	-.70
	Mastery-avoidance	-.41	-.63
	Performance-approach	-.42	-.75
	Performance-avoidance	-.56	-.29

As shown in Table 4, all variables except gender (a dummy variable) had skewness and kurtosis values between -1 and +1, indicating normal distribution (Hair et al., 2013). Although the gender variable had a slightly higher value, it fell within the acceptable range of -1.5 to +1.5 (Tabachnick & Fidell, 2013), confirming normality for all variables.

Multivariate normality was assessed using Mardia’s test (Zhang & Yuan, 2018). Table 5 presents the results of Mardia’s test:

Table 5. Mardia’s Test:

	b	z	P
Skewness	8.39	490.84	5.272
Kurtosis	144.18	0.66	5.116

Table 5 presents the results, showing no significant skewness or kurtosis ($p > .05$) (Gocer Sahin & Bulus, 2022), confirming multivariate normality. Additionally, a Normal P-P plot (Figure 4) and a scatterplot (Figure 5) were used to check normality and linearity, respectively.

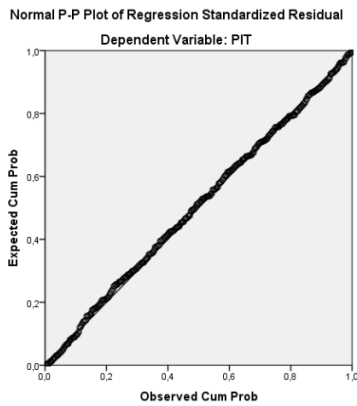


Figure 4. Normal P-P Plot

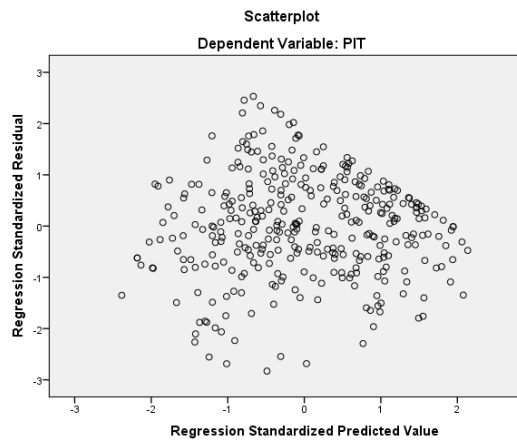


Figure 5. Scatter Plot

Figure 4 shows that data points form a reasonable diagonal line from bottom left to top right, supporting normality. In Figure 5, the scatterplot shows data points clustering around zero, confirming linearity. Additionally, the fact that none of the data points fell beyond +3.3 or -3.3 further confirms the absence of outliers in the dataset. Finally, Cook’s distance values were all below 1, with a maximum of 0.038, indicating the independence of residuals (Tabachnick & Fidell, 2013).

2.5. Research Ethics

The participants of this study took part after providing informed consent. The XXXX University Social and Humanities Ethics Committee approved the study as being in compliance with scientific ethical standards under approval number 190834.

3. Findings

The model summary indicating the extent to which gender, subdimensions of entrepreneurship, and sub dimensions of achievement goals predict professional innovativeness tendencies is presented in Table 6.

Table 6. Model Summary

Model	R	R ²	Adjusted R ²	Change statistics	
				ΔR^2	P
1	,118	,014	,011	,014	,027
2	,588	,345	,340	,331	,000
3	,593	,351	,344	,006	,074
4	,594	,352	,343	,001	,512
5	,705	,497	,482	,145	,000

According to Model 1 in Table 6, being female explains 1.1% of the variance in professional innovativeness tendencies. In Model 2, being female, along with mastery-approach and mastery-avoidance goals, accounts for 34% of the variance. When controlling for gender, mastery-approach and mastery-avoidance goals independently and significantly predict 33.1% of the variance in professional innovativeness tendencies ($p < .001$). In Model 3, the inclusion of performance-approach goals slightly increases the explained variance to 34.4%, but performance-approach goals do not significantly contribute to the model when gender and mastery goals are controlled for ($p > .05$). Model 4 includes gender and all subdimensions of achievement goals (mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance), collectively explaining 34.3% of the variance. Performance-avoidance goals do not have a significant effect when other variables are controlled for ($p > .05$). Model 5, which incorporates gender, all subdimensions of achievement goals, and all subdimensions of entrepreneurship (risk-taking, opportunity recognition, self-confidence, emotional intelligence, and innovativeness), explains 48.2% of the variance in teacher candidates' professional innovativeness tendencies. When controlling for gender and achievement goals, subdimensions of entrepreneurship significantly predict 14.5% of the variance ($p < .001$). ANOVA test results, employed to determine the significance of these models, are provided in Table 7.

Table 7. ANOVA Test Results

Model		Sum of squares	df	Mean square	F	p
1	Regression	1,754	1	1,754	4,945	,027
	Residual	123,789	349	,355		
	Total	125,543	350			
2	Regression	43,364	3	14,455	61,034	,000
	Residual	82,179	347	,237		
	Total	125,543	350			
3	Regression	44,121	4	11,030	46,873	,000
	Residual	81,422	346	,235		
	Total	125,543	350			
4	Regression	44,222	5	8,844	37,523	,000
	Residual	81,320	345	,236		
	Total	125,543	350			
5	Regression	62,371	10	6,237	33,569	,000
	Residual	63,172	340	,186		
	Total	125,543	350			

As shown in Table 7, the ANOVA results indicate that all models are statistically significant: Model 1 [$F(1, 349) = 4.945, p < .05$], Model 2 [$F(3, 347) = 61.034, p < .001$], Model 3 [$F(4, 346) = 46.873, p <$

.001], Model 4 [$F(5, 345) = 37.523, p < .001$], and Model 5 [$F(10, 340) = 33.569, p < .001$]. Table 8 presents the findings on the individual contributions of each variable in these models.

Table 8. Unique Contributions of Predictor Variables

Model	Predictive variables		B	Standard Error	β	T	p
1	Gender	Being a female	,159	,072	,118	2,224	,027
2	Gender	Being a female	,081	,059	,060	1,370	,172
	Achievement	Mastery-approach	,336	,058	,354	5,794	,000
	Goals	Mastery-avoidance	,215	,048	,273	4,465	,000
3	Gender	Being a female	,081	,059	,060	1,375	,170
	Achievement	Mastery-approach	,315	,059	,331	5,328	,000
	Goals	Mastery-avoidance	,192	,050	,243	3,846	,000
		Performance-approach	,063	,035	,092	1,794	,074
4	Gender	Being a female	,084	,059	,062	1,427	,155
	Achievement	Mastery-approach	,314	,059	,330	5,311	,000
	Goals	Mastery-avoidance	,200	,052	,254	3,884	,000
		Performance-approach	,082	,045	,118	1,815	,070
		Performance-avoidance	-,029	,045	-,043	-,656	,512
5	Gender	Being a female	,078	,052	,058	1,487	,138
	Achievement	Mastery-approach	,177	,055	,186	3,226	,001
	Goals	Mastery-avoidance	,122	,047	,155	2,614	,009
		Performance-approach	,015	,041	,022	,370	,712
		Performance-avoidance	-,039	,040	-,058	-,986	,325
	Entrepreneurship	Risk taking	,044	,055	,038	,794	,428
		Opportunity recognition	,372	,067	,323	5,562	,000
		Self-confidence	,035	,065	,031	,532	,595
		Emotional intelligence	,144	,067	,120	2,154	,032
	Innovativeness	,046	,047	,049	,979	,328	

As shown in Table 8, being female significantly predicts innovativeness in Model 1 ($\beta = .32; p < .05$). However, as additional variables are introduced, the effect of gender becomes nonsignificant across all models ($p > .05$). Mastery-approach and mastery-avoidance goals consistently make significant contributions in Models 2, 3, 4, and 5, while performance-approach and performance-avoidance goals do not significantly predict professional innovativeness in any model ($p > .05$). In the final model, which includes all variables, gender, performance-approach, performance-avoidance, risk-taking, self-confidence, and innovativeness do not significantly predict professional innovativeness ($p > .05$). However, mastery-approach, mastery-avoidance, opportunity recognition, and emotional intelligence significantly predict professional innovativeness ($p < .05$). The variables that significantly predict professional innovativeness, ranked by their predictive power from largest to smallest, are opportunity recognition ($\beta = .32$), mastery-approach ($\beta = .19$), mastery-avoidance ($\beta = .16$), and emotional intelligence ($\beta = .12$).

4. Discussion and Conclusion

The findings of this study reveal that, as hypothesized, being female, although having a relatively low predictive power, significantly predicts professional innovativeness tendencies of teacher candidates. This result aligns with existing literature, which suggests that women exhibit higher levels of innovativeness in various contexts (Kocasarac, 2021; Mulhim, 2018; Tekcan & Gecer, 2022; Uzundal, 2021; Yilmaz et al., 2014; Yuceer & Tumkaya, 2024). However, when additional variables, particularly mastery-approach and mastery-avoidance goals, are included in the model, the effect of gender becomes non-significant, and the initial hypothesis regarding gender is rejected. This indicates that the impact of gender on professional innovativeness may overlap with or be mediated

by other variables, such as mastery goals. This finding supports previous research that did not find significant gender differences in innovativeness (Akca & Sakar, 2017; Alagoz et al., 2019; Bautista et al., 2018; Kilic, 2015; Kubat Bakir et al., 2022; Yilmaz & Beskaya, 2018) and suggests that similarities in characteristics like achievement goals and entrepreneurial tendencies among male and female participants may explain these results.

As predicted, mastery goals as a block significantly predict professional innovativeness, both independently and when other variables are controlled. Moreover, when considered together with other variables, both mastery-approach and mastery-avoidance goals individually contribute to explaining professional innovativeness tendencies of teacher candidates. In summary, individuals with mastery goals, whether approach or avoidance-oriented, tend to display higher levels of professional innovativeness tendency. These findings are consistent with studies showing a strong relationship between learning motivation and innovativeness (Law & Breznik, 2017). One possible explanation is that individuals with mastery goals are more likely to prioritize intrinsic life expectations, such as personal growth (Janke & Dickhäuser, 2019). Since professional innovativeness requires teachers to continually develop their competencies—one of the essential attitudes and values in teaching (General Directorate of Teacher Training and Development [GDTTD], 2017)—this connection seems logical. Additionally, the positive relationship between mastery goals and innovativeness may be linked to the higher creativity observed in individuals with these goals (Cai & Wen, 2018). Teachers who generate new ideas can transform their work environment, facilitating the spread of innovation. Furthermore, the desire to improve one's competencies, a hallmark of individuals with mastery goals (Senko, 2016), likely drives a higher level of professional innovativeness. This finding is also supported by research showing that mastery goals are related to the intention to implement innovation (Gorozidis & Papaioannou, 2016). Thus, teacher candidates with mastery goals may exhibit higher levels of professional innovativeness due to their willingness to implement future innovations in their professional lives.

Regardless of how mastery goals are modeled—whether as a block or individually, independently, or alongside other variables—they consistently predict professional innovativeness. In contrast, performance goals, when included separately as performance-approach and performance-avoidance goals, fail to explain professional innovativeness tendency, both independently and when controlling for other variables. Consequently, the hypotheses that performance-approach and performance-avoidance goals would positively and negatively predict professional innovativeness, respectively, are rejected. This finding differs from Alexander and Van Knippenberg's (2014) model, which suggests that both mastery and performance goals can be beneficial for team innovation at different stages. The discrepancy may be due to this study's focus on individual professional innovativeness. However, the results align with Gorozidis and Papaioannou's (2016) research, which found that while mastery goals indirectly influence the intention to implement innovation, performance goals do not successfully predict this intention. Similarly, Sijbom et al. (2015) found that leaders with mastery goals are more likely to embrace creative (and thus innovative) ideas from subordinates, while those with performance goals are more likely to resist them.

The inability of performance goals to explain occupational innovativeness can generally be attributed to the fact that individuals with such orientations are driven more by the desire to outperform others rather than to achieve the best or the newest (Anderman & Patrick, 2012). This is because these individuals may not feel the need to be innovative unless those they wish to surpass are themselves innovators. Therefore, it can be speculated that the participants in this study who had performance goals were likely in environments where there were no highly innovative individuals whom they felt compelled to surpass. Another reason why individuals with performance goals may fail to exhibit occupational innovativeness is that this orientation often leads them toward superficial learning (Dawe, 2020). Yet, innovation requires exploration, research, development (Akay & Çetin Gürkan, 2021), and deep, lifelong learning capable of driving fundamental change rather than superficial understanding (Mülhim, 2018).

When examined specifically, this study found that performance-avoidance goals do not predict occupational innovativeness and do not make a significant contribution to the model developed with other variables to explain occupational innovativeness. This finding does not align with previous research indicating that performance-avoidance has a negative impact on innovative performance (Zhou, 2021). One possible explanation for the current study's results is that individuals with performance-avoidance goals may be unwilling to take the risks associated with innovation (Elliot & Harackiewicz, 1996). This is because every attempt at innovation carries inherent risks, including the possibility of complete failure, even when the attempt ultimately succeeds.

Similar to performance-avoidance goals, performance-approach goals also fail to explain occupational innovativeness tendency, either individually or in combination with other variables. This result contradicts previous findings that suggest a relationship between performance goals focused on proving oneself and innovative behavior (Cai & Wen, 2018). While it is understandable that performance-approach, like performance-avoidance, is an orientation defined by normative competence, it remains unexpected because performance-approach carries more positive connotations compared to performance-avoidance (Elliot & McGregor, 2001). Furthermore, the association of performance-approach goals with extrinsic life expectations, such as fame and recognition (Janke & Dickhäuser, 2019), makes this finding unexpected. According to the mentioned research, individuals with performance-approach goals should have exhibited higher levels of professional innovativeness tendency, as such traits could lead to fame, recognition, and wealth. However, in the context of this study, the specific setting should be considered: it was conducted in Türkiye, focusing on teacher candidates at a public university. In Türkiye, teacher candidates are assigned to positions based on scores from a nationwide exam and subsequent interviews, with no assessment of their innovativeness. Teachers who secure jobs in the public sector receive average salaries. Although the recently enacted Teaching Profession Law (Turkish Grand National Assembly, 2024) has slightly increased the salaries of teachers who pursue further education, such as graduate studies, these increments are not substantial enough to make them wealthy or famous. Teachers who do not secure a public school's position often turn to other professions, such as policing (Sahin Gok & Kiraz, 2023), or work at private schools for much lower salaries than those of public servants (Cerev & Coskun, 2020). In summary, education in Türkiye does not yet offer fame or wealth for its employees. Therefore, performance-approach goals linked to the desire for fame, recognition, and wealth do not naturally predict professional innovativeness in the context of teaching in Türkiye.

As hypothesized, the subdimensions of entrepreneurship collectively and significantly predict professional innovativeness when controlling for other variables. This finding aligns with research indicating that entrepreneurial competencies facilitate the establishment of innovation (Kyrgidou & Spyropoulou, 2013), that entrepreneurial curiosity positively influences innovativeness (Peljko et al., 2016), and that entrepreneurial orientation predicts innovativeness (Tajeddini, 2010).

Upon examining the individual contributions of entrepreneurial subdimensions, it becomes evident that risk-taking, self-confidence, and innovativeness do not significantly predict professional innovativeness. The inability of risk-taking to predict professional innovativeness is intriguing, given that it is often considered a component of individual innovativeness and a characteristic of innovative teachers (Erkoc & Kert, 2013; Gur-Erdogan et al., 2014). This result may be due to the inclusion of other variables, such as performance-avoidance, in the model. Since individuals with performance-avoidance goals are generally risk-averse (Zhou, 2021), the effect of risk-taking on professional innovativeness may have been suppressed.

Similarly, self-confidence does not independently predict professional innovativeness. According to the literature, while self-confidence does not predict social innovativeness in bank employees (Sekerdil, 2016), it can explain consumer innovativeness (Jurgensen & Guesalaga, 2018). This suggests that self-confidence may influence certain forms of innovativeness but not necessarily professional innovativeness.

One of the study's most surprising findings is that the subdimension of innovativeness within entrepreneurship does not significantly contribute to professional innovativeness. This contradicts research by Can (2020), which found a moderate, positive relationship between individual and professional innovativeness. This outcome may also be due to the influence of other variables in the model. Moreover, this result may suggest that entrepreneurial innovativeness and professional innovativeness in the context of teaching do not share many commonalities.

Opportunity recognition, on the other hand, significantly predicts professional innovativeness, supporting the assertion that innovativeness involves creatively recognizing and leveraging opportunities (Gozukara & Colakoglu, 2016). Studies have shown that opportunity recognition has a strong impact on innovativeness in various international contexts (Aghazadeh & Zandi, 2022; Lorenz et al., 2018).

Emotional intelligence also significantly predicts professional innovativeness, consistent with research suggesting that emotional intelligence serves as an antecedent to innovative performance and behaviors (Abdullah et al., 2021; Binsaeed et al., 2023). Another study supporting these findings indicates that the strongest dimension of emotional intelligence predicting innovativeness is the regulation of emotion in others (Ngah & Salleh, 2015). However, considering the context of Türkiye and the limitations of this study, it is likely that the observed result is more related to the regulation of one's own emotions. In Türkiye, becoming a pre-service teacher requires passing a challenging two-stage assessment process (a centralized exam and an interview) to secure a teaching position. Teacher candidates who cannot manage the stress of this rigorous process may feel compelled to prioritize exam preparation over self-renewal, as the exam itself does not demand innovation or renewal. Conversely, only those candidates who can effectively manage this stress are expected to find the time to both renew themselves and prepare for the assessment process. This is because only teacher candidates with well-developed emotional intelligence can cope with the anxiety that investing time and energy in self-renewal might hinder their chances of appointment.

Overall, when controlling for other variables, mastery goals explain professional innovativeness better than entrepreneurship. One primary reason for this could be that mastery goals are fundamentally focused on learning, and every instance of learning brings about behavioral change, which is essentially innovation. In this study, occupational innovativeness is considered within the context of the teaching profession. For a teacher, whose role is to teach learning itself, the most significant form of professional innovation is indeed learning. Additionally, as Corrêa et al. (2022) pointed out, entrepreneurship is often associated with survival needs, which may also explain this finding. A teacher who does not genuinely hold mastery goals and does not face a critical risk, such as losing their job, may not feel the need to engage in self-renewal. In the context of teaching in Türkiye, there is no professional obligation for teachers to innovate. However, a teacher with mastery goals will feel a continuous need to renew themselves, even if it is not expected of them and even if it is not crucial for their professional career, simply to achieve personal growth or avoid feelings of inadequacy.

In the final model, the variables that significantly predict professional innovativeness in order of their contribution are opportunity recognition, mastery-approach, mastery-avoidance, and emotional intelligence. This emphasizes the importance of providing mastery-oriented and emotionally intelligent teachers with opportunities for innovation. Mastery-approach goals' greater unique contribution to explaining occupational innovativeness compared to other achievement goals supports the view that this orientation leads to most desirable outcomes among achievement goals (Dawe, 2020). The lower predictive power of mastery-avoidance goals, compared to mastery-approach goals, may stem from these individuals' fear of falling short of their goals (Linnenbrink & Pintrich, 2002), even if they set professional innovativeness as a goal.

4.1. Limitations and Future Directions

This study has several limitations. First, the hierarchical multiple regression model was constructed by sequentially entering the predictor variables in the following order: gender, mastery goals, performance-approach goals, performance-avoidance goals, and subdimensions of entrepreneurship. Future research could explore different sequences of these variables to examine potential variations in the results. Additionally, this study focused on professional innovativeness within the context of teaching. Future studies could investigate whether gender, achievement goals, and entrepreneurship predict innovativeness in different professional fields.

The effect of gender on professional innovativeness tendencies became non-significant when mastery goals were included in the analysis. Thus, future research could examine the mediating role of mastery goals in the relationship between gender and professional innovativeness. Since this finding suggests that gender may influence professional innovativeness indirectly through achievement goals, teacher candidates could be guided to develop mastery goals to enhance their professional innovativeness. Given that mastery goals are primarily related to intrinsic motivation, such guidance could emphasize strategies for fostering intrinsic motivation, especially in the context of learning.

The study identified opportunity recognition as the most influential predictor of professional innovativeness tendencies. Therefore, it is crucial for teacher education programs to ensure that teacher candidates are aware of national and international opportunities, such as conferences, workshops, projects, exchange programs, and events that can support their professional development. Teacher education programs should also work to make these opportunities economically and culturally accessible for candidates. Institutions lacking sufficient opportunities should allocate more budget resources and incentivize faculty members to create and promote such opportunities.

Emotional intelligence emerged as a significant antecedent of professional innovativeness in this study. Future research should identify emotions and emotional triggers that may hinder professional innovativeness among teacher candidates. Based on such research findings, teacher candidates could be trained in emotional regulation techniques to manage emotions that may impede their professional innovativeness. Furthermore, steps should be taken to control or mitigate triggers that negatively impact their emotional well-being, thus supporting a more innovative professional outlook.

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Submitted/Received	Accepted
8 January 2026	3 March 2026