

Examining The Relationship Between Individual Innovativeness and Resistance to Change in Pre-Service Teachers

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Abstract

This study aims to examine the relationship between pre-service teachers' individual innovativeness characteristics and their resistance to change. The research was conducted using the relational survey model, and the study group consisted of volunteer pre-service teachers studying at the faculty of education of a university located in the Central Anatolia Region during the 2023–2024 academic year. Data were collected through the individual innovativeness Scale, the Resistance to Change Scale, and a personal information form. According to the findings, 4.4% of the pre-service teachers were identified as innovators, 30.1% as early adopters, 52.6% as early majority, 11.3% as late majority, and 1.7% as laggards. While no significant differences were found in individual innovativeness scores based on gender, academic program, or grade level, significant differences emerged according to whether they had repeated courses and their daily internet usage time. For resistance to change scores, no significant differences were found in terms of gender or internet usage time, whereas statistically significant differences were observed based on academic program and grade level. Finally, the results revealed a moderate, negative, and statistically significant relationship between individual innovativeness and resistance to change.

Keywords: Individual innovativeness, resistance to change, pre-service teachers.

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1. INTRODUCTION

The current era stands out as an era in which technological transformation and innovativeness-oriented changes markedly reshape social structures. These transformations affect many domains of society such as the economy, health, communication, and education. They also redefine how individuals and institutions operate. For this reason, societies need to monitor change and innovativeness, adapt to emerging requirements, and manage related processes effectively. This capacity has critical importance for increasing societal welfare. Innovativeness has therefore gained a priority position in state policies in many countries, particularly in developed ones (Ersoy & Şengül, 2008). This societal orientation makes deep transformations in education systems inevitable. It also raises the integration of innovative approaches across many dimensions from curricula to teacher roles. Researchers emphasize that changes in science, technology, and the economy in the twenty first century accelerate transformations in education (Kocasaraç & Karataş, 2018).

The Turkish Language Association defines innovativeness as replacing elements regarded as outdated, harmful, or insufficient with new, beneficial, and adequate alternatives (Turkish Language Association [TDK], 2024a). This definition indicates that innovativeness involves more than introducing something new. It also aims to make existing conditions more functional and effective. Innovativeness represents a fundamental dynamic that supports the development of individuals and societies. It enables the creation of new ideas, products, and processes across a wide range of areas, from production processes to service delivery. Throughout history, people have developed innovative ways to sustain their lives and address the problems they encountered. In this way, innovativeness has become one of the driving forces of progress and development. From this perspective, supporting and adopting innovativeness can be regarded as an essential requirement for advancing in fields such as education, economy, health, and technology.

In addition to the societal effects of innovativeness, its emergence at the individual level also matters. Individual innovativeness refers to a concept that considers individuals' characteristic and personal features and helps explain differences in their responses during attempts to try innovativeness (Şahin, 2016). Kılıçer (2011) addresses individual innovativeness in relation to an individual's attitude toward innovativeness, willingness to adopt innovativeness, capacity to integrate innovativeness into daily life, and skill in benefiting from innovativeness. This perspective indicates that the degree to which individuals at the center of innovativeness accept and use innovativeness plays a decisive role in understanding innovativeness. Rogers (2003) classifies individual innovativeness into five categories. Innovators tend to take risks, remain open to trying new ideas, and adopt a forward looking stance. Early adopters adopt innovativeness rapidly, guide others, and show interest in technology. The early majority evaluate innovativeness carefully, avoid haste, and refrain from risk taking. The late majority approach innovativeness cautiously and adapt after most people adopt innovativeness. Laggards show resistance to change, accept innovativeness last, and prefer to maintain the existing order.

This classification supports understanding attitudes toward innovativeness. It also helps bring teachers' innovativeness roles into focus within educational contexts. Innovative teachers

can offer more effective learning environments when they incorporate innovativeness into their classroom practices. Their efficient use of technology in the classroom can also enrich the teaching process (Bakır, 2022). Effective technology use depends on teachers' ability to analyze the current situation accurately. It also depends on their ability to select technological tools and instructional methods that match students' needs and to implement the selected methods in a planned manner. For this reason, researchers also regard the development of new instructional strategies as important (Demiraslan & Usluel, 2008). However, the sustainability of innovative approaches in educational settings often relates closely to how teachers perceive and manage the change process.

At this point, discussions of innovativeness need to address the concept of change as well. The Turkish Language Association defines change as "the totality of changes within a timeframe; change" (TDK, 2024b). Thus, change can be conceptualized as a process through which an existing state evolves or transforms into another state over time (Çolakoğlu, 2005). Change includes differences in the structure, essence, or functioning of a phenomenon. It can also relate to concepts such as development, adaptation, innovativeness, and transformation. Although change represents an inevitable phenomenon, this reality does not justify leaving the process to spontaneous and random developments. Instead, individuals and societies need to manage change in a planned and systematic manner to support development. This need becomes even more important for pre-service teachers who will work in education where change holds a central place. Pre-service teachers cannot remain static and continue their existing approaches in the face of the pace and direction of change in education (Erdoğan, 2012). Researchers also note that change constitutes a fundamental requirement for teachers' professional development and that sustained professional progress becomes difficult without change (Çolakoğlu, 2005).

In addition to the individual dimension of change, researchers should also consider its organizational context. Timurturkan (2010) notes that organizations operate in an environment of continuous economic, social, and technological change. This situation makes organizational change a necessity. For this reason, organizations in both the public and private sectors are expected to review their structures and processes and take steps toward restructuring and improvement. The literature shows that early studies addressed organizational change and resistance to change. Studies by Lewin (1947) and Coch and French (1948) discuss resistance to change as one of the important outcomes of change (Timurturkan, 2010). Resistance to change can be viewed as an individual's reluctance to accept change or the development of responses that aim to obstruct change. This resistance relates to maintaining habits, anxiety about uncertainty, and distrust of the unknown. Oreg (2006) conceptualizes resistance to change as a multicomponent construct with cognitive, emotional, and behavioral dimensions. Cognitive resistance involves mental questioning about the necessity and usefulness of change. Emotional resistance involves affect based evaluations of change. Behavioral resistance involves responses that reject the change process and attempts to influence others by emphasizing the perceived lack of usefulness of change.

Organizations' ability to sustain their existence under rising competition and uncertainty depends on their capacity to adapt to change and manage it effectively. Change is also inevitable in educational organizations. Planning and implementing change does not suffice. The management of the process plays a decisive role. One of the main challenges in change

management concerns the resistance to change that individuals and organizations may display. Established habits and anxiety arising from uncertainty can intensify this resistance. For this reason, an effective change management strategy requires more than designing change. It also requires understanding the sources of resistance and identifying how to reduce it (Çerezci, 2019).

Within this theoretical framework, the main purpose of the study is to examine the relationship between pre-service teachers' individual innovativeness characteristics and their resistance to change levels. In line with this purpose, the study seeks answers to the following research questions.

1. What are the individual innovativeness characteristics of pre-service teachers based on their scores on the individual innovativeness scale?
2. What are the resistance to change levels of pre-service teachers based on their scores on the resistance to change scale?
3. Do pre-service teachers' individual innovativeness characteristics and resistance to change levels differ significantly across gender, course repetition status, program of study, year level, and daily internet use time?
4. Is there a significant relationship between pre-service teachers' individual innovativeness characteristics and their resistance to change levels?

2. METHODS

2.1. Study Design

This study used a correlational survey design to identify the relationship between pre-service teachers' individual innovativeness characteristics and their resistance to change levels. Correlational survey designs represent a quantitative research approach that allows researchers to examine the presence and direction of relationships between two or more variables (Karasar, 2012).

2.2. Participants

The study drew on data collected from pre-service teachers enrolled in the faculty of education at a public university in Türkiye during the spring semester of the 2023–2024 academic year, all of whom participated voluntarily.

Table 1. *Participant characteristics*

Variables		f	%
Gender	Female	689	77.1
	Male	205	22.9
	Total	894	100.0
Course Repetition Status	Yes	161	18.0
	No	733	82.0
	Total	894	100.0
Program of Study	(1) Science Education	55	6.2
	(2) Mathematics Education	124	13.9
	(3) Early Childhood Education	124	13.9

	(4) Guidance and Psychological Counseling (RPD)	214	24.0
	(5) Primary Education	167	18.7
	(6) Social Studies Education	95	10.5
	(7) Turkish Language Education	115	12.8
	Total	894	100.0
Year Level	(1) 1st year	272	30.4
	(2) 2nd year	240	26.9
	(3) 3rd year	188	21.0
	(4) 4th year	194	21.7
	Total	894	100.0
Daily Internet Use Time	(1) 0 to 3 hours	221	24.7
	(2) 3 to 6 hours	484	54.1
	(3) 6 to 9 hours	189	21.1
	Total	894	100.0

As shown in Table 1, the participants included 689 women (77.1%) and 205 men (22.9%). Regarding course repetition status, 161 pre-service teachers (18.0%) reported at least one repeated course, whereas 733 (82.0%) reported none. In terms of program of study, 55 participants (6.2%) studied Science Education, 124 (13.9%) studied Mathematics Education, 124 (13.9%) studied Early Childhood Education, 214 (24.0%) studied Guidance and Psychological Counseling, 167 (18.7%) studied Primary Education, 95 (10.5%) studied Social Studies Education, and 115 (12.8%) studied Turkish Language Education. The sample included 272 first-year students (30.4%), 240 second-year students (26.9%), 188 third-year students (21.0%), and 194 fourth-year students (21.7%). With respect to daily internet use, 221 participants (24.7%) reported using the internet for 0 to 3 hours, 484 (54.1%) for 3 to 6 hours, and 189 (21.1%) for 6 to 9 hours.

2.3. Data Gathering Tools

In this study, the researchers collected data using the individual innovativeness scale adapted into Turkish by Kılıçer and Odabaşı (2010), the resistance to change scale adapted into Turkish by Çalışkan (2019), and a personal information form developed by the researcher. The researchers obtained ethics committee approval to collect the study data. They also obtained institutional permission from the dean's office of the relevant faculty of education.

2.3.1. Individual innovativeness scale

Kılıçer and Odabaşı (2010) adapted into Turkish the 20 item scale developed by Hurt et al. (1977). It consists of 12 positively worded items (items 1, 2, 3, 5, 8, 9, 11, 12, 14, 16, 18, and 19) and 8 negatively worded items (items 4, 6, 7, 10, 13, 15, 17, and 20). Participants responded to the items on a five point Likert type scale ranging from *strongly disagree* to *strongly agree*. Total scores allow researchers to classify individuals into innovativeness categories: *Innovators* (≥ 80), *Early adopters* (69–80), *Early majority* (57–68), *Late majority* (46–56), and *Laggards* (< 46). In addition, scores above 68 indicate *high innovativeness*, whereas scores below 64 indicate *low innovativeness*. In their validity and reliability study, Kılıçer and Odabaşı (2010) reported an overall internal consistency coefficient of .82 and a test-

retest reliability coefficient of .87. In this research, the analysis yielded a Cronbach's alpha coefficient of .81.

2.3.2. Resistance to change scale

Çalışkan (2019) adapted into Turkish the 15 item scale developed by Oreg (2006). The scale comprises three subdimensions: cognitive, emotional, and behavioral resistance. Participants responded to the items using a five point Likert type rating scale in which 1 indicated *strongly disagree* and 5 indicated *strongly agree*. Items 4, 5, 8, and 15 are reverse keyed. Total scores range from 15 to 75. Higher scores on the scale and its subdimensions indicate higher levels of resistance to change, whereas lower scores indicate lower levels of resistance. Çalışkan (2019) reported Cronbach's alpha coefficients of .94 for the overall scale, .92 for the cognitive resistance subdimension, .91 for the emotional resistance subdimension, and .91 for the behavioral resistance subdimension. In this research, the analysis yielded a Cronbach's alpha coefficient of .83 for the overall scale.

2.4. Data Analysis

To select appropriate tests for quantitative data analysis, the researchers first examined whether the data met the normality assumption. In studies with large samples, researchers often rely on the Kolmogorov–Smirnov test (Cevahir, 2020). A statistically significant Kolmogorov–Smirnov result indicates non normality when p falls below .05, whereas a non significant result indicates normality when p exceeds .05 (Büyüköztürk, 2024). As shown in Table 2, the p values for both the resistance to change scale and the individual innovativeness scale fell below .05. The Kolmogorov–Smirnov results therefore did not support the normality assumption.

The researchers then examined skewness and kurtosis to evaluate normality in greater depth. Tabachnick et al. (2007) state that skewness and kurtosis within ± 1.5 indicate an approximately normal distribution. Pallant (2001) presents a similar criterion within ± 2 . As shown in Table 2, skewness and kurtosis values for the resistance to change scale and the individual innovativeness scale ranged from .100 to 1.165. These values suggest that the data approximated a normal distribution and did not meaningfully violate the assumptions of parametric tests.

Table 2. Kolmogorov–Smirnov test results and skewness and kurtosis values for the scales

Scale	Kolmogorov–Smirnov			Skewness	Kurtosis
	Statistic	df	p		
Individual innovativeness scale	.070	894	.000	.100	1.058
Resistance to change scale	.055	894	.000	.117	1.165

Given the approximate normality of the data, the researchers used independent samples t tests to examine whether pre-service teachers' resistance to change and individual innovativeness differed significantly by gender and course repetition status. The researchers used one way ANOVA to examine whether pre-service teachers' resistance to change and individual innovativeness differed significantly by program of study, year level, and daily internet use time. In post hoc analyses, the researchers selected the LSD test by considering Agbangba et al. (2024), who emphasize that the LSD test remains applicable even when group sizes are unequal.

In addition, during the examination of categorical variables, the researchers observed that all cell frequencies exceeded 5 and met the assumption required for the chi square test (Can, 2013). The researchers used the chi square test to examine the relationships between participants' individual innovativeness characteristics and resistance to change levels. The researchers also examined the relationship between scores from resistance to change and individual innovativeness scales by calculating the Pearson correlation coefficient.

3. FINDINGS

3.1. Results for Pre-service Teachers' Individual Innovativeness Characteristics

Descriptive statistics for the individual innovativeness scale scores of the 894 pre-service teachers showed a mean of 65.45 and a standard deviation of 8.47. Based on these results and the scale's scoring criteria, the participants' individual innovativeness levels can be classified in the "Early majority" category. Table 3 presents detailed descriptive data on the categorical distribution of pre-service teachers by individual innovativeness level.

Table 3. Distributions of pre-service teachers across individual innovativeness categories

		Innovators		Early adopters		Early majority		Late majority		Laggards		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Gender	Female	29	4,2	213	30,9	352	51,1	84	12,2	11	1,6	689	77,1
	Male	10	4,9	56	27,3	118	57,6	17	8,3	4	2,0	205	22,9
Total		39	4,4	269	30,1	470	52,6	101	11,3	15	1,7	894	100

As shown in Table 3, the distribution by gender indicates that, among the 689 female pre-service teachers, 29 (4.2%) fall into the Innovators category, 213 (30.9%) into Early adopters, 352 (51.1%) into Early majority, 84 (12.2%) into Late majority, and 11 (1.6%) into Laggards. Among the 205 male pre-service teachers, 10 (4.9%) fall into Innovators, 56 (27.3%) into Early adopters, 118 (57.6%) into Early majority, 17 (8.3%) into Late majority, and 4 (2.0%) into Laggards. Kılıçer and Odabaşı (2010) note that scores above 68 indicate a high level of innovativeness, whereas scores below 64 indicate a low level of innovativeness. Based on these criteria, 308 pre-service teachers showed high innovativeness, whereas 349 showed low innovativeness.

3.1.1. Examination of pre-service teachers' individual innovativeness characteristics by gender

Table 4 presents findings on whether pre-service teachers' scores on the Individual innovativeness scale differ significantly by gender.

Table 4. Independent samples *t* test results for pre-service teachers' individual innovativeness scale scores by gender

Gender	N	$\bar{X}$	S	t	df	p
Female	689	65.418	8.653	-.226	892	.821
Male	205	65.570	7.851			

As shown in Table 4, the independent samples *t* test results indicated that pre-service teachers' individual innovativeness scale scores did not differ significantly by gender ($p > .05$). In other words, gender did not relate to differences in individual innovativeness scores.

3.1.2. Examination of pre-service teachers' individual innovativeness characteristics by course repetition status

The independent samples *t* test examined whether pre-service teachers' scores on the individual innovativeness scale differed significantly by course repetition status. Table 5 presents the results.

Table 5. Independent samples *t* test results for pre-service teachers' individual innovativeness scale scores by course repetition status

Course Repetition Status	N	$\bar{X}$	S	t	df	p	Cohen d
Yes	161	64.049	8.420	-2.327	892	.020	.202
No	733	65.761	8.458				

As shown in Table 5, pre-service teachers' scores on the individual innovativeness scale differed significantly by course repetition status ($p < .05$). In other words, individual innovativeness scores varied according to whether participants reported a repeated course.

3.1.3. Examination of pre-service teachers' individual innovativeness characteristics by program of study

Table 6 reports the means and standard deviations of pre-service teachers' scores on the individual innovativeness scale across programs of study.

Table 6. Descriptive statistics for pre-service teachers' individual innovativeness scale scores by program of study

Program of Study	N	$\bar{X}$	S
Science Education	55	66.290	6.919
Mathematics Education	124	64.314	8.402
Early Childhood Education	124	64.338	7.838
Guidance and Psychological Counseling	214	65.948	8.128
Primary Education	168	65.785	8.977
Social Studies Education	94	66.404	8.032
Turkish Language Education	115	64.217	9.917
Total	894	65.453	8.472

As shown in Table 6 the mean individual innovativeness scale scores by program of study were 66.290, 64.314, 64.338, 65.948, 65.785, 66.404, 64.217, and 65.453, respectively. Table 7 presents findings on whether pre-service teachers' individual innovativeness scores differed significantly across programs of study.

Table 7. One way ANOVA results for pre-service teachers' individual innovativeness scores by program of study

	Sum of Squares	df	Mean Square	F	p
Between Groups	535.938	6	89.323	1.245	.281
Within Groups	63547.737	886	71.724		
Total	64083.675	892			

As shown in Table 7 the one way ANOVA results indicated that pre-service teachers' scores on the individual innovativeness scale did not differ significantly by program of study. In other words, individual innovativeness scale scores did not vary across programs.

3.1.4. Examination of pre-service teachers' individual innovativeness characteristics by year level

Table 8 reports the means and standard deviations of pre-service teachers' individual innovativeness scores by year level.

Table 8. *Descriptive statistics for pre-service teachers' individual innovativeness scores by year level*

Year Level	N	$\bar{X}$	S
1st year	272	64.926	8.649
2nd year	240	65.004	8.144
3rd year	188	65.957	8.564
4th year	194	66.257	8.505
Total	894	65.453	8.472

As shown in Table 8 the mean individual innovativeness scale scores by year level were 64.926, 65.004, 65.957, and 66.257, respectively. Table 9 presents findings on whether pre-service teachers' individual innovativeness scores differed significantly by year level.

Table 9. *One way ANOVA results for pre-service teachers' individual innovativeness scores by year level*

	Sum of Squares	df	Mean Square	F	p
Between Groups	297.229	3	99.076	1.382	.247
Within Groups	63806.298	890	71.692		
Total	64103.527	893			

As shown in Table 9, the one way ANOVA results indicated that pre-service teachers' scores on the individual innovativeness scale did not differ significantly by year level. In other words, individual innovativeness scale scores did not vary across year levels.

3.1.5. Examination of pre-service teachers' individual innovativeness characteristics by daily internet use time

Table 10 reports the means and standard deviations of pre-service teachers' scores on the individual innovativeness scale across categories of daily internet use time.

Table 10. *Descriptive statistics for pre-service teachers' individual innovativeness scores by daily internet use time*

Daily Internet Use Time	N	$\bar{X}$	S
0 to 3 hours	221	66.995	8.281
3 to 6 hours	484	64.995	8.357
6 hours or more	189	64.820	8.805
Total	894	65.453	8.472

As shown in Table 10, the mean individual innovativeness scale scores across daily internet use categories were 66.995, 64.995, and 64.820, respectively. Table 11 presents findings on whether pre-service teachers' individual innovativeness scores differed significantly across daily internet use categories.

Table 11. One way ANOVA results for pre-service teachers' individual innovativeness scores by daily internet use time

	Sum of Squares	df	Mean Square	F	p	Eta-squared
Between Groups	702.656	2	351.328	4.937	.007	.011
Within Groups	63400.871	891	71.157			
Total	64103.527	893				

As shown in Table 11, the one way ANOVA results indicated that pre-service teachers' scores on the individual innovativeness scale differed significantly across daily internet use categories, $F_{(2, 893)} = 4.937$, $p < .05$. In other words, individual innovativeness scores varied by daily internet use time.

Table 12. LSD post hoc multiple comparison results

Daily Internet Use Time: I	Daily Internet Use Time: J	Mean Difference I-J	Standard Error	p	Source of Difference
(1) 0 to 3 hours	(2) 3 to 6 hours	1.999*	.684	.004	1>2
	(3) 6 hours or more	2.175*	.835	.009	1>3
(2) 3 to 6 hours	(1) 0 to 3 hours	-1.999*	.684	.004	2<1
	(3) 6 hours or more	.175	.723	.808	
(3) 6 hours or more	(1) 0 to 3 hours	-2.175*	.835	.009	3<1
	(2) 3 to 6 hours	-.175	.723	.808	

Table 12 reports the LSD post hoc results and identifies the source of the differences. Pre-service teachers who reported 0 to 3 hours of daily internet use differed significantly in individual innovativeness scores from those who reported 3 to 6 hours and from those who reported 6 hours or more.

3.2. Findings on Pre-service Teachers' Resistance to Change

Descriptive statistics for the resistance to change scale scores of the 894 pre-service teachers showed a mean of 36.351 and a standard deviation of 7.677. The researchers grouped pre-service teachers' resistance to change levels into four categories by considering mean scores and the standard error: low, moderate, high, and very high. Based on the cut points, scores from 15 to 28.67 indicate low resistance to change, scores from 28.68 to 36.50 indicate moderate resistance, scores from 36.51 to 44.03 indicate high resistance, and scores from 44.04 to 75 indicate very high resistance to change. Table 13 presents descriptive statistics for pre-service teachers' resistance to change scale scores.

Table 13. Distributions of pre-service teachers across resistance to change levels

		Low		Moderate		High		Very high		Total	
		N	%	N	%	N	%	N	%	N	%
Gender	Female	91	13,2	264	38,3	253	36,7	81	11,8	689	77,1
	Male	33	16,1	67	32,7	76	37,1	29	14,1	205	22,9
Total		124	13,9	331	37,0	329	36,8	110	12,3	894	100

As shown in Table 13, among female pre-service teachers, 13.2% fell into the low category, 38.3% into the moderate category, 36.7% into the high category, and 11.8% into the

very high category of resistance to change. Among male pre-service teachers, 16.1% fell into the low category, 32.7% into the moderate category, 37.1% into the high category, and 14.1% into the very high category. Overall, 13.9% of pre-service teachers fell into the low category, 37.0% into the moderate category, 36.8% into the high category, and 12.3% into the very high category of resistance to change.

3.2.1. Examination of pre-service teachers' resistance to change by gender

The researchers used an independent samples t test to examine whether pre-service teachers' scores on the resistance to change scale differed significantly by gender. Table 14 presents the results.

Table 14. Independent samples t test results for pre-service teachers' resistance to change scores by gender

Gender	N	$\bar{X}$	S	t	df	p
Female	689	36.362	7.687	.083	892	.934
Male	205	36.312	7.663			

As shown in Table 14, the independent samples t test results indicated that pre-service teachers' scores on the resistance to change scale did not differ significantly by gender ($p > .05$). In other words, resistance to change scores did not vary by gender.

3.2.2. Examination of pre-service teachers' resistance to change by course repetition status

The researchers used an independent samples t test to examine whether pre-service teachers' scores on the resistance to change scale differed significantly by course repetition status. Table 15 presents the results.

Table 15. Independent samples t test results for pre-service teachers' resistance to change scores by course repetition status

Course Repetition Status	N	$\bar{X}$	S	t	df	p
Yes	161	36.869	7.876	.946	892	.344
No	733	36.237	7.634			

As shown in Table 15, the independent samples t test results indicated that pre-service teachers' scores on the resistance to change scale did not differ significantly by course repetition status ($p > .05$). In other words, resistance to change scores did not vary by course repetition status.

3.2.3. Examination of pre-service teachers' resistance to change by program of study

Table 16 reports the means and standard deviations of pre-service teachers' scores on the resistance to change scale across programs of study

Table 16. Descriptive statistics for pre-service teachers' resistance to change scale scores by program of study

Program of Study	N	$\bar{X}$	S
Science Education	55	35.909	7.538
Mathematics Education	124	38.129	6.876
Early Childhood Education	124	36.177	7.160
Guidance and Psychological Counseling	214	35.364	8.063
Primary Education	168	37.107	7.728
Social Studies Education	94	35.223	7.998
Turkish Language Education	115	36.487	7.748
Total	894	36.351	7.677

As shown in Table 16, the mean resistance to change scale scores by program of study were 35.909, 38.129, 36.177, 35.364, 37.107, 35.223, 36.487, and 36.351, respectively. Table 17 presents findings on whether pre-service teachers' resistance to change scores differed significantly across programs of study.

Table 17. One way ANOVA results for pre-service teachers' resistance to change scores by program of study

	Sum of Squares	df	Mean Square	F	p	Eta-squared
Between Groups	832.455	6	138.743	2.375	.028	.016
Within Groups	51807.258	887	58.407			
Total	52639.714	893				

As shown in Table 18, the LSD post hoc multiple comparison results differed significantly across programs of study.

Table 18. LSD post hoc multiple comparison results

Program of Study: I	Program of Study: J	Mean Difference I-J	Standard Error	p	Source of Difference
(1) Science Education	(2) Mathematics Education	-2.219	1.238	.073	
	(3) Early Childhood Education	-.268	1.238	.828	
	(4) Guidance and Psychological Counseling	.544	1.155	.637	
	(5) Primary Education	-1.198	1.187	.313	
	(6) Social Studies Education	.685	1.297	.597	
	(7) Turkish Language Education	-.577	1.252	.645	
(2) Mathematics Education	(1) Science Education	-2.219	1.238	.073	
	(3) Early Childhood Education	1.951*	.970	.045	2>3
	(4) Guidance and Psychological Counseling	2.764*	.862	.001	2>4
	(5) Primary Education	1.021	.904	.254	
	(6) Social Studies Education	2.905*	1.045	.006	2>6

	(7) Turkish Language Education	1.642	.989	.097	
(3) Early Childhood Education	(1) Science Education	.268	1.238	.828	
	(2) Mathematics Education	-1.951*	.970	.045	3<2
	(4) Guidance and Psychological Counseling	.812	.862	.346	
	(5) Primary Education	-.929	.904	.304	
	(6) Social Studies Education	.954	1.045	.362	
	(7) Turkish Language Education	-.309	.989	.754	
(4) Guidance and Psychological Counseling	(1) Science Education	-.544	1.155	.637	
	(2) Mathematics Education	-2.764*	.862	.001	4<2
	(3) Early Childhood Education	-.812	.862	.346	
	(5) Primary Education	-1.742*	.787	.027	4<5
	(6) Social Studies Education	.141	.945	.881	
	(7) Turkish Language Education	-1.122	.883	.204	
(5) Primary Education	(1) Science Education	1.198	1.187	.313	
	(2) Mathematics Education	-1.021	.904	.259	
	(3) Early Childhood Education	.929	.904	.304	
	(4) Guidance and Psychological Counseling	1.742*	.787	.027	5>4
	(6) Social Studies Education	1.883	.984	.056	
	(7) Turkish Language Education	.620	.924	.503	
(6) Social Studies Education	(1) Science Education	-.685	1.297	.597	
	(2) Mathematics Education	-2.905*	1.045	.006	6<2
	(3) Early Childhood Education	-.954	1.045	.362	
	(4) Guidance and Psychological Counseling	-.141	.945	.881	
	(5) Primary Education	-1.883	.984	.056	
	(7) Turkish Language Education	-1.263	1.062	.235	
(7) Turkish Language Education	(1) Science Education	.577	1.252	.645	
	(2) Mathematics Education	-1.642	.989	.097	

(3) Early Childhood Education	.309	.989	.754
(4) Guidance and Psychological Counseling	1.122	.883	.204
(5) Primary Education	-.620	.924	.503
(6) Social Studies Education	1.263	1.062	.235

As shown in Table 18, the one way ANOVA results indicated that pre-service teachers' scores on the resistance to change scale differed significantly across programs of study, $F_{(6, 893)} = 2.375$, $p < .05$. In other words, resistance to change scores varied by program of study. Table 17 also reports the LSD post hoc results and identifies the source of the differences. Pre-service teachers in the Mathematics Education program scored significantly higher on the resistance to change scale than those in the Early Childhood Education, Guidance and Psychological Counseling, and Social Studies Education programs. In addition, pre-service teachers in the Primary Education program scored significantly higher than those in the Guidance and Psychological Counseling program.

3.2.4. Examination of pre-service teachers' resistance to change by year level

The researchers conducted a one way ANOVA to examine whether pre-service teachers' scores on the resistance to change scale differed significantly by year level. Table 19 reports the means and standard deviations of the scores by year level.

Table 19. Descriptive statistics for pre-service teachers' resistance to change scores by year level

Year Level	N	$\bar{X}$	S
1st year	272	37.014	7.339
2nd year	240	36.937	7.979
3rd year	188	35.622	8.059
4th year	194	35.402	7.270
Total	894	36.351	7.677

As shown in Table 19, the mean resistance to change scale scores by year level were 37.014, 36.937, 35.622, and 35.402, respectively. Table 20 presents findings on whether pre-service teachers' resistance to change scores differed significantly by year level.

Table 20. One way ANOVA results for pre-service teachers' resistance to change scores by year level

	Sum of Squares	df	Mean Square	F	p	Eta-squared
Between Groups	476.885	3	158.962	2.712	.044	.009
Within Groups	52162.829	890	58.610			
Total	52639.714	893				

Based on the results reported in Table 20, the one way ANOVA indicated that pre-service teachers' scores on the resistance to change scale differed significantly by year level. In other words, resistance to change levels varied across year levels.

Table 21. LSD post hoc multiple comparison results

Year Level: I	Year Level: J	Mean Difference I-J	Standard Error	p	Source of Difference
(1) 1st year	(2) 2nd year	.077	.678	.909	1>4
	(3) 3rd year	1.392	.726	.055	
	(4) 4th year	1.612*	.719	.025	
(2) 2nd year	(1) 1st year	-.077	.678	.909	2>4
	(3) 3rd year	1.315	.745	.078	
	(4) 4th year	1.535*	.739	.038	
(3) 3rd year	(1) 1st year	-1.392	.726	.055	
	(2) 2nd year	-1.315	.745	.078	
	(4) 4th year	.220	.783	.779	
(4) 4th year	(1) 1st year	-1.612	.719	.025	4<1
	(2) 2nd year	-1.535	.739	.038	4<2
	(3) 3rd year	-.220	.783	.779	

As shown in Table 21, the one way ANOVA results indicated that pre-service teachers' scores on the resistance to change scale differed significantly by year level, $F_{(3, 893)} = 2.712$, $p < .05$. In other words, resistance to change scores varied across year levels. Table 21 also reports the LSD post hoc results and identifies the source of the differences. Pre-service teachers in the fourth year scored significantly lower on the resistance to change scale than those in the first and second years.

3.2.5. Examination of pre-service teachers' resistance to change by daily internet use time

Table 22 reports the means and standard deviations of pre-service teachers' scores by daily internet use time.

Table 22. Descriptive statistics for pre-service teachers' resistance to change scores by daily internet use time

Daily Internet Use Time	N	$\bar{X}$	S
0 to 3 hours	221	35.298	7.799
3 to 6 hours	484	36.803	7.652
6 hours or more	189	36.423	7.517
Total	894	36.351	7.677

As shown in Table 22, the mean resistance to change scale scores across daily internet use categories were 35.298, 36.803, and 36.423, respectively. Table 23 presents findings on whether pre-service teachers' resistance to change scores differed significantly across daily internet use categories.

Table 23. One way ANOVA results for pre-service teachers' resistance to change scores by daily internet use time

	Sum of Squares	df	Mean Square	F	p
Between Groups	344.933	2	172.467	2.938	.053
Within Groups	52294.780	891	58.692		
Total	52639.714	893			

Based on the results reported in Table 23, the one way ANOVA indicated that pre-service teachers' scores on the resistance to change scale did not differ significantly across daily internet use categories, $F_{(2, 891)} = 2.938$, $p > .05$. Descriptive statistics showed a slightly lower mean score for those who reported 0 to 3 hours of daily internet use ($M = 35.298$) than for those who

reported 3 to 6 hours ($M = 36.803$) and 6 hours or more ($M = 36.423$). However, this difference did not reach statistical significance.

3.3. Findings on the Relationship Between Pre-service Teachers' Individual Innovativeness Characteristics and Resistance to Change

The researchers used a bivariate correlation analysis to examine the relationship between pre-service teachers' individual innovativeness levels and their resistance to change levels. Table 24 presents findings on the relationship between individual innovativeness and resistance to change scores.

Table 24. *Correlation between individual innovativeness and resistance to change scores*

	Resistance to change
Individual innovativeness	-.525**

**Correlation is significant at the 0.01 level.

As shown in Table 24, pre-service teachers' scores on the individual innovativeness scale showed a statistically significant, moderate, negative correlation with their scores on the resistance to change scale. The researchers conducted a chi square test to examine the association between pre-service teachers' individual innovativeness levels and their resistance to change levels. Table 25 presents the results.

Table 25. *Association between individual innovativeness categories and resistance to change levels*

Variables	N	Resistance to change Levels				χ^2	p
		Low	Moderate	High	Very high		
Individual innovativeness						297.948	.000
Innovators	39	27	8	4	0		
Early adopters	269	65	132	61	11		
Early majority	470	26	179	209	56		
Late majority	101	2	11	53	35		
Laggards	15	4	1	2	8		
Total	894	124	331	329	110		

As shown in Table 25, pre-service teachers' individual innovativeness characteristics showed a statistically significant, moderate association with their resistance to change levels, $\chi^2(12, N = 894) = 297.948$, $p < .05$, Cramer's $V = .333$. Pre-service teachers with Innovators and Early adopters characteristics more often showed lower resistance to change levels than those with Early majority, Late majority, and Laggards characteristics. Similarly, pre-service teachers with very high and high resistance to change levels more often showed Late majority and Laggards characteristics.

4. DISCUSSION, CONCLUSION and SUGGESTIONS

The findings show that pre-service teachers' individual innovativeness profiles concentrated primarily in the Early majority category at 52.6% and the Early adopters category at 30.1%. This distribution suggests that pre-service teachers do not reject innovativeness outright. Instead, they tend to evaluate innovativeness cautiously and make decisions after careful consideration rather than adopting them rapidly. The relatively low proportion in the Innovators category at 4.4% indicates that few candidates adopt innovativeness first and show a comparatively high willingness to take risks. At the same time, the low proportions in the Late

majority and Laggards categories suggest that most candidates remain open to innovativeness while prioritizing evaluation before adoption.

Consistent with this overall pattern, the classification based on Kılıçer and Odabaşı (2010) scale score criteria also indicates that a substantial proportion of pre-service teachers fall into the low innovativeness level. This finding may indicate that pre-service teachers have not yet developed sufficiently strong tendencies to promote change and innovativeness in their future professional practice. It may also signal that rapid adaptation capacities in areas such as digital transformation, sustainable education, and twenty first century skills have not yet developed to a sufficient extent (UNESCO, 2023). These results suggest that teacher education programs should address individual innovativeness not only as a personality based attribute but also as a competency area that programs can develop systematically (Kimmons, 2021). Fullan (2020) also emphasizes that teachers need more than openness to innovativeness to act as agents of change. They also need the capacity to integrate innovativeness into their pedagogical practices. Therefore, undergraduate teacher education should increase innovativeness-oriented applications and experiences.

Across demographic variables, individual innovativeness scores did not differ significantly by gender. This result indicates that female and male pre-service teachers reported similar levels of innovativeness. The OECD's global analysis of teacher competencies also notes limited gender based differences in innovativeness and technology integration, and it attributes observed differences more to variables such as self efficacy and digital literacy (OECD, 2023a). Prior research also aligns with this result (Özgür, 2013; Korucu & Olpak, 2015; Topal & Karaman, 2021). The broader availability of technological tools and more balanced digital literacy across genders may also contribute to the reduction of gender based differences in innovativeness (Anderson & Rainie, 2022). Within this framework, the limited role of gender can be viewed as a positive indicator in terms of equality of educational opportunity.

Course repetition status emerged as a factor that may relate to individual innovativeness, with higher levels observed among pre-service teachers without repeated courses. This finding suggests a positive relationship between innovativeness and academic achievement. OECD (2023b) conceptualizes individual innovativeness as a twenty first century learning competency and notes that individuals with higher innovativeness may also show higher academic achievement. Similarly, Karaca and Arslan (2021) report that innovative attitudes may relate to cognitive flexibility, openness to learning, and academic responsibility. However, because studies that focus directly on course repetition status remain limited, future research should test this result with larger samples and additional variables. Even so, evidence suggesting that individual innovativeness may relate to openness to learning and active engagement in academic processes (İzmirli & Gürbüz, 2017) and findings indicating that risk taking and coping with uncertainty may support innovativeness (Deniz, 2016) align with this interpretation.

Program of study did not produce significant differences in pre-service teachers' individual innovativeness scores, which offers an important point for interpreting individual innovativeness within an institutional or organizational context. This result suggests that innovativeness may relate less to program based factors and more to individual characteristics

and learning experiences. Kılıçer and Odabaşı (2010) associate innovativeness with personality traits, life experiences, and attitudes toward change. Lucas and Claxton (2022) emphasize the role of intrinsic motivation and opportunities within the learning environment in the development of innovative behaviors. At the same time, some studies report that certain programs may support innovativeness more strongly (İzmirli & Gürbüz, 2017). The absence of a significant difference in the present study may indicate that instructional methods, instructors' approaches, and the institutional learning culture matter more than program membership.

Similarly, the absence of significant differences in individual innovativeness scores by year level suggests that innovativeness does not increase automatically as students progress through the program. Prior research highlights the role of attitudes, motivation, the learning environment, and experience in shaping innovativeness, often more strongly than year level (Özgür, 2013; İzmirli & Gürbüz, 2017). Although mean scores showed a slight increase across year levels, the difference was not statistically significant. This result underscores the need for structured practices to support innovativeness throughout the program. This approach aligns with the role of institutional learning culture and instructional strategies emphasized by the OECD (2023c).

The results for daily internet use time suggest that pre-service teachers who spend less time online may show higher individual innovativeness scores. This result suggests that the relationship may depend less on a linear association and more on the purpose and quality of internet use. Anderson and Jiang (2018) note that extended internet use often centers on social media and entertainment, which may not sufficiently support creative thinking. Kirschner and De Bruyckere (2017) emphasize that excessive and aimless use may increase superficial information processing and negatively affect critical and innovative thinking. In contrast, Korucu and Olpak (2015) reported no significant difference in relation to internet use time. Within this framework, researchers should consider productive and learning oriented forms of internet use rather than duration alone.

Complementing the individual innovativeness results, the resistance to change findings show that pre-service teachers' resistance levels clustered mainly at moderate and high levels, with approximately 49% reporting high or very high resistance. This pattern suggests that resistance may create a substantial barrier to the adoption and implementation of innovativeness in educational settings. Therefore, it is important to develop awareness raising activities, training content focused on innovative practices, and supportive management strategies that can help reduce pre-service teachers' resistance to change.

The absence of gender differences in resistance to change scores aligns with prior research (Kahraman & Yılmaz, 2018). Fullan (2020) argues that value systems and beliefs about change may shape change processes more strongly than gender. In addition, the lack of differences in resistance to change by course repetition status suggests that academic variables may have limited explanatory power for resistance. Studies emphasize associations between resistance levels and factors such as personality traits, self-efficacy, emotional resilience, and environmental support (Oreg, 2003; Fullan, 2020). Ertmer and Ottenbreit-Leftwich (2010) also highlight the role of cognitive beliefs in adaptation to change. Within this framework,

interventions should address more than academic performance. They should also incorporate individual perceptions and supportive learning environments.

However, significant differences in resistance to change levels across programs suggest that the content and structure of teacher education programs may influence resistance. The higher resistance levels among pre-service elementary mathematics teachers than those in some other programs, and the higher resistance among pre-service primary teachers than among pre-service guidance and psychological counseling teachers, may indicate that programs provide change-oriented learning experiences at different levels. This result aligns with studies showing that resistance to change in organizational settings can vary across contextual variables (Aydın & Şahin, 2016). Akmal and Miller (2003) note that structural and psychological barriers within programs may increase resistance. The OECD (2023d) also emphasizes that integrating skills such as flexible thinking, self-management, collaboration, and creativity across subject areas may help address resistance.

The results for year level suggest that pre-service teachers in higher years may become more open to change. This pattern aligns with explanations indicating that the knowledge and skills acquired during teacher education, practicum experiences, and professional maturation can reshape perspectives on change (Guskey, 2002; Day & Gu, 2007). The early stage of professional identity development in the first year may also help explain more cautious attitudes (Richardson & Placier, 2001). In contrast, the lack of significant differences between daily internet use time and resistance to change suggests that technology use alone may not suffice to reduce resistance (Selwyn, 2016; Rogers, 2003; Fullan, 2020).

Finally, the statistically significant, moderate, negative relationship between individual innovativeness and resistance to change suggests that greater innovativeness may strengthen more open and flexible attitudes toward change. The lower resistance levels among candidates in the innovators and early adopters profiles, and the higher resistance levels among those in the late majority and laggards profiles, also point to the need to develop support mechanisms in teacher education programs that respond to different profiles. In particular, the systematic integration of skills such as critical thinking, flexibility, and adaptation to technology into programs may help prepare pre-service teachers for evolving educational settings (Yılmaz, 2021). These findings align with approaches that emphasize the importance of individual factors in change processes (Fullan, 2020) and support arguments regarding the value of adopting innovative approaches in professional development (Hargreaves & Fullan, 2015).

Flexible and personalized learning environments that pay greater attention to individual differences can encourage the development of pre-service teachers' individual innovativeness characteristics and contribute to reducing resistance to change. Seminars and workshops on change management, innovativeness, and leadership can also promote greater openness to change among pre-service teachers. In addition, practice-oriented activities can help pre-service teachers who show resistance to change strengthen their openness to change and their capacity to generate innovative solutions. Group work and activities that employ innovative instructional methods may further reduce resistance to change while reinforcing individual innovativeness characteristics. Because program content may influence pre-service teachers' resistance to

change levels, departments can develop differentiated innovative strategies tailored to their own needs and thereby foster more flexible and adaptive orientations toward change.

Future research may examine the effects of including activities in teacher education programs that promote creative thinking, problem solving, and risk-taking skills to strengthen pre-service teachers' individual innovativeness characteristics. Programs should also place greater emphasis on practice-oriented training in technology use and contemporary instructional methods to enhance pre-service teachers' capacity for innovative thinking. Wider use of innovative instructional methods may further support individual innovativeness characteristics. Researchers may also examine how systematic instructional practices designed to foster critical thinking, innovative solution generation, and independent learning influence pre-service teachers' individual innovativeness characteristics and their resistance to change.

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