The Relationship between Pre-Service Teachers' Five-Factor Personality Traits and Public Speaking Anxiety[*]

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Abstract

The aim of this study is to examine the relationship between pre-service teachers' public speaking anxiety and their five-factor personality traits. The study was conducted with 503 pre-service teachers aged between 18 and 35. The data were collected using the Public Speaking Anxiety Scale, the Quick Big Five Personality Test, and a personal information form. Results from multiple regression analysis indicated that neuroticism and agreeableness significantly and positively predicted public speaking anxiety, whereas extraversion, openness to experience, and conscientiousness significantly and negatively predicted it. In addition, gender was also found to be a significant predictor, with female pre-service teachers reporting higher levels of public speaking anxiety than their male counterparts. The model explained 37% of the variance in public speaking anxiety. Based on the findings, it is recommended to design psychoeducational programs aimed at enhancing the communication skills and reducing the speaking anxiety of pre-service teachers, particularly those with introverted or neurotic personality traits. Such interventions could contribute significantly to their professional competence and effectiveness in classroom communication.

Keywords: Speech anxiety, personality traits, pre-service teachers, public speaking.

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Öğretmen Adaylarının Beş Faktör Kişilik Özellikleri ile Topluluk Önünde Konuşma Kaygıları Arasındaki İlişki[*]

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Öz

Bu araştırmanın amacı, öğretmen adaylarının topluluk önünde konuşma kaygıları ile beş faktör kişilik özellikleri arasındaki ilişkiyi incelemektir. Çalışma, yaşları 18 ile 35 arasında değişen 503 öğretmen adayıyla yürütülmüştür. Veri toplama aracı olarak Topluluk Önünde Konuşma Kaygısı Ölçeği, Hızlı Beş Faktör Kişilik Testi ve kişisel bilgi formu kullanılmıştır. Çoklu regresyon analizi sonuçları, nevrotiklik ve uyumluluk özelliklerinin topluluk önünde konuşma kaygısını anlamlı düzeyde pozitif yönde yordadığını; dışadönüklük, deneyime açıklık ve sorumluluk özelliklerinin ise kaygıyı anlamlı düzeyde negatif yönde yordadığını ortaya koymuştur. Ayrıca, cinsiyet değişkeni de kaygı düzeyini anlamlı şekilde yordamakta olup, kadın öğretmen adaylarının erkeklere kıyasla daha yüksek düzeyde kaygı yaşadığı bulunmuştur. Model genel olarak topluluk önünde konuşma kaygısındaki varyansın %37'sini açıklamaktadır. Elde edilen bulgular doğrultusunda, özellikle içedönük ve nevrotik kişilik özelliklerine sahip öğretmen adaylarına yönelik iletişim becerilerini geliştirmeyi ve kaygılarını azaltmayı hedefleyen psikoeğitim programlarının geliştirilmesi önerilmektedir. Bu tür müdahaleler, öğretmen adaylarının mesleki yeterliklerine ve sınıf içi iletişim becerilerine önemli katkılar sağlayabilir.

Anahtar Sözcükler: Topluluk önünde konuşma kaygısı, kişilik özellikleri, öğretmen adayları, topluluk önünde konuşma.

Introduction

Public speaking skills are of great importance for individuals working in many different disciplines because an influential speech sparks interest, helps listeners understand and can influence attitudes and behaviours (Englehart, 2004). One of the groups that frequently use these skills in their professional life is teachers. In this context, teachers must have public speaking skills in order for classroom communication to be effective (Petek, 2014). In particular, the experience of public speaking of pre-service teachers is a necessary condition not only for the teaching activity but also for increasing the effectiveness of the pedagogical activity (Ryndak vd., 2022). Therefore, it is important for pre-service teachers to acquire these skills throughout their training period. However, speaking in public can cause anxiety in some individuals to a level comparable to the fear of death (Dwyer and Davidson, 2012). Public speaking anxiety (PSA) is defined as "a situation-specific social anxiety that occurs during the anticipation or execution of an oral presentation" (Bodie, 2010). PSA is quite common among people and causes individuals to isolate themselves from social and professional environments and hesitate to participate in activities (Hancock et al., 2010; Pull, 2012). PSA is affected by many factors, including social comparison (Ayres, 1986), audience attitudes (Pertaub et al., 2002), past school and family experiences (Erdoğan, 2018), self-focus (Daly et al., 1989), pre-speech preparation (Coker, 2022) and lack of self-confidence (Raja, 2017). The anxiety level of an individual who is assigned to speak in public fluctuates starting from the moment he/she learns that he/she has to give a speech (Behnke and Sawyer, 1999). As can be seen, public speaking anxiety is open to fluctuation depending on situational factors. However, while some individuals feel generally anxious, others do not in the same situation. This anxiety, called "Trait PSA", refers to a general tendency to feel anxiety about public speaking (Bodie, 2010). In this context, it is thought that people's attitudes towards communication can be shaped by biologically based dispositions (McCroskey et al., 2001). These innate dispositions have been discussed by different theorists. McCrae and Costa (1987) classified these dispositions as five-factor personality traits and defined them as universal characteristics that can be seen in all cultures. Identifying these personality traits and examining their relationship with PSA can be suggested to contribute to the improvement of the quality of education by enabling pre-service teachers to develop their strengths and recognize potential areas of difficulty early. In this context, it is considered important to conduct the current study on pre-service teachers for whom speaking skills are critical in their profession because teachers need public speaking skills in many situations such as lectures, seminar speeches and parent meetings. Therefore, pre-service teachers need to develop these skills and identify possible obstacles and work on them before starting their professional career. Public speaking anxiety, which is quite common, can be considered one of these obstacles.

According to McCrae and Costa (1987), biologically based dispositions are a hierarchical whole of all personality traits and are defined in five comprehensive dimensions (extraversion, neuroticism, openness to experience, agreeableness, conscientiousness). The trait of extraversion is characterized by being talkative, energetic, active, assertive and enthusiastic. Openness to experience is the sum of the characteristics of curiosity, broad interest, imagination and understanding. Neuroticism refers to a set of anxious, tense, touchy, worried and unbalanced characteristics. Agreeableness refers to the sum of the characteristics of being generous, forgiving, kind, reliable, sympathetic and tolerant. Finally, conscientiousness is related to being organized, planned, responsible, meticulous and productive (McCrae and John, 1992). These dispositions develop throughout a person's life and have an impact on how the individual thinks and behaves. In addition, dispositions also have an effect on emotions an individual experiences in daily life (Feist and Feist, 2008). For example, in their experimental study, McNiel and Fleeson (2006) revealed that exhibiting behaviours characterized by extraversion leads to positive emotions, and exhibiting behaviours related to neuroticism leads to negative emotions. Examining the effect of these dispositions on pre-service teachers' classroom experiences and their ability to transfer knowledge to students may be important both educationally and pedagogically. Because personality can be seen as more fundamental than other variables to understand the cause of behavior and it may be necessary to consider the role of personality when interventions for behavior are needed. Therefore, the current study aims to examine the role of five-factor personality traits and gender on public speaking anxiety in pre-service teachers.

Five-Factor Personality Traits, Gender and Public Speaking Anxiety

The characteristics of an individual who is anxious about communication appear to be similar to the characteristics of introversion and neuroticism (Beatty et al., 1998). For example, it has been reported that introverts experience more anxiety and discomfort than extroverts in situations such as group discussions and public speaking (Hz., 2022; Shahzadi et al. 2024). In addition to feeling less anxiety, extroverts speak more effectively (Hamedi et al., 2015). In this context, the first hypothesis of the study is as follows:

H_1: Extraversion negatively predicts public speaking anxiety.

Since the personality trait of neuroticism is characterized as a predisposition to negative emotions (Widiger, et al., 2017), it is logical that it is related to communication-based anxieties such as public speaking anxiety. Therefore, neurotic individuals may be expected to feel more anxiety when they are asked to make a speech. For example, neuroticism predicts social anxiety (Newby et al., 2017) and is positively correlated with speech anxiety (Allan, et al., 2016; Daronkolaie & Taghsara, 2024; Kelsen, 2019). In this context, the second hypothesis of the study is as follows:

H_2: Neuroticism positively predicts public speaking anxiety.

In literature the relationship between the other three characteristics and social anxiety or PSA is not as clear as the other two dimensions. In a study examining the relationship between PSA and five-factor personality traits, Kelsen (2019) found that conscientiousness, openness to experience, and extraversion were negatively related to PSA, while neuroticism was positively related to PSA. No significant relationship was found between agreeableness and PSA. In their study examining the relationship between social anxiety and five-factor personality traits, Kaplan et al. (2015) found a negative significant relationship between openness to experience, extraversion and agreeableness and social anxiety, and a positive significant relationship between social anxiety and neuroticism. No significant relationship was found with conscientiousness. Openness to experience can be considered as a trait that reduces public speaking anxiety. Since it leads individuals to exciting activities rather than fixed things (Feist & Feist, 2008). This makes public speaking more desirable for individuals with this trait. Therefore, they may have less anxiety. In addition, individuals with openness to experience may have improved themselves in this regard because they can act more actively. For example, high openness to experience is linked to better semantic memory structure, which leads to more connected, flexible, and unique responses compared to individuals with low openness to experience (Christensen, 2018). Indeed, openness to experience has been reported to be associated with communicative skills (Franco et al., 2020). In this context, the second hypothesis of the study is as follows:

H_3: Openness to experience negatively predicts public speaking anxiety.

Kaplan et al. (2015) found no significant relationship between conscientiousness and social anxiety, while Kelsen (2019) reported a negative relationship between conscientiousness and public speaking anxiety. Thus, the link between conscientiousness and social anxiety or PSA appears to be complex. On the other hand, public speaking may require a planned preparation process, and it is important that the speech is fluent and organized. Individuals with a high sense of responsibility may have less anxiety by planning and managing their speeches better. In this context, the second hypothesis of the study is as follows:

H_4: Conscientiousness negatively predicts public speaking anxiety.

Individuals with high agreeableness exhibit good-natured, submissive and accepting attitudes (Feist & Feist, 2008). The fact that agreeable individuals are more sensitive to social processes may contribute to the development of their social skills. Indeed, Kaplan et al. (2015) reported a negative relationship between agreeableness and social anxiety. However, public speaking is more related to performance, and high agreeableness may cause individuals to become more sensitive to the negative evaluations of the environment and increase their fear of being criticized while speaking in public. This can lead to anxiety during public speaking. In line with this purpose, the following hypotheses were tested:

H_5: Agreeableness positively predicts public speaking anxiety.

In addition to other psychological factors, gender has also been found to play a role in public speaking anxiety and social anxiety. It has been reported that women experience more anxiety than men (Asher & Aderka, 2018; Lintner & Belovecová, 2024). This issue becomes critical in the context of teacher education in Turkiye, where the majority of education faculty students are women (Council of Higher Education, 2024). Therefore, investigating public speaking anxiety among pre-service teachers with a focus on gender is also necessary to inform targeted interventions and improve teacher education programs. In line with this purpose, the following hypotheses were tested:

H_6: Gender significantly predicts public speaking anxiety.

Method

Research Design

The research model is the relational survey model, one of the quantitative research models. The survey model provides a quantitative description of the tendencies, attitudes or opinions in the general population through studies conducted on a sample selected from a population. The researcher makes inferences about the population based on the results obtained from the sample (Creswell, 2017). In this study, the role of five factor personality traits and gender in the public speaking anxiety of pre-service teachers was examined.

Study Group

A total of 503 pre-service teachers from two different public universities in Turkiye voluntarily participated in the study. Of the participants, 387 (76.9%) are female and 116 (23.1%) are male. The mean age of the participants is 20.3 (Sd: 1.62; range: 18-35). Of the participants selected using the convenience sampling method, 195 (38.8%) are first-year, 155 (30.8%) are second-year and 153 (30.4%) are third-year university students attending an education faculty. Moreover, 174 (34.6%) of the participants are from the Department of Primary School Mathematics Teaching, 167 (33.2%) are from the Department of Psychological Counselling and Guidance, 122 (24.3%) are from the Department of Turkish Teaching, 40 (8%) are from the Department of Primary School Teaching.

Research Instrument

Personal Information Form

We developed a form to determine the gender, age and grade level of the participants.

Public Speaking Anxiety Scale

Public Speaking Anxiety Scale (PSAAS) developed by Bartholomay and Houlihan (2016) and adapted into Turkish by Doğru Çabuker et al. (2020) was used in the study. The scale consists of a total of 16 items and has a 5-point Likert-type rating system (1=Never, 5= Extremely). The scale consists of three sub-dimensions: cognitive (7 items), behavioral (4 items) and psychological (5 items). In the Turkish adaptation study of the scale, Cronbach's alpha internal consistency coefficients were found to be .93 for the total score, .88 for the cognitive dimension, .69 for the behavioral dimension and .86 for the psychological dimension. The fit indices obtained in confirmatory factor analysis (χ^2=211.55, χ^2/sd=2.18, GFI=.88, IFI=.947, RMR=.063, RMSEA=.077) confirmed the construct validity of the scale. These results indicate that the scale is a valid and reliable instrument for measuring public speaking anxiety.

Quick Big Five Personality Test

Quick Big Five Personality Test (QBFPT), developed by Vermulst and Gerris (2005) and adapted into Turkish by Morsünbül (2014), consists of a total of 30 items and has a 7-point Likert-type rating system (1=Totally False, 7=Totally True). The scale consists of five sub-dimensions: extraversion, agreeableness, conscientiousness, emotional stability and openness to experience and each sub-dimension is measured with six items. In the Turkish adaptation study of the scale, confirmatory factor analysis (CFA) results revealed that the five-factor structure of the scale was valid (χ^2/sd=3.76, GFI=.91, CFI=.92, NFI=.91, NNFI=.91, RMSEA=.08). Cronbach's alpha internal consistency coefficients were .81 for extraversion, .80 for agreeableness, .86 for conscientiousness, .78 for emotional stability and .73

for openness to experience. These results show that the scale is a valid and reliable tool for measuring personality traits.

Procedure and Data Analysis

The data were gathered from students of the faculty of education at two state universities in Turkiye. Prior to data collection, the necessary permissions were obtained from the relevant faculty members and the students were informed about the purpose of the study. The data were collected face-to-face using the paper-and-pencil method, and the data collection process took approximately 8-10 minutes. The data was transferred to SPSS 26. Total scores were calculated by considering the reverse-scored items. To test the normality of the data, skewness and kurtosis values were checked and it was decided that the data were normal. Prior to conducting the multiple regression analysis, assumptions were tested. Initially, scatterplots were examined, revealing a linear relationship between the independent variables and the dependent variable. Correlation coefficients among independent variables were observed to be below .80, indicating that the assumption of multicollinearity was satisfied. Standardized residual values ranged between -3.29 and +3.29 (min: -2.864; max: 2.878), and Cook's distance was less than 1 (0.54), indicating no influential outliers were present in the dataset (Field, 2018; Steven, 2009). Furthermore, examination of histograms and scatterplots demonstrated that the distribution of residuals was normal, and the assumption of homoscedasticity was met. Finally, multiple regression analysis was conducted to determine whether five-factor personality traits and gender predict public speaking anxiety. Gender was included in the regression analysis as a dummy variable, with female coded as 0 and male coded as 1.

Ethical Procedures

This study was conducted with the approval of the Selcuk University, Faculty of Education Ethics Committee (Approval No: 20 – 31.01.2022) ensuring adherence to ethical standards and protocols for research involving human participants.

Results

Table 1. *Mean, standard deviation, kurtosis, skewness, cronbach alpha and correlation values for the variables*

Variable	M	Sd	Kurtosis	Skewness	α	1	2	3	4	5
1.PSA	2.80	.74	-.41	.16	.93	1				
2. A	5.51	.80	.06	-.47	.74	-.15*	1			
3. E	4.14	1.1	-.44	.01	.83	-.47*	.25*	1		
4. C	4.80	1.1	-.17	-.43	.83	-.16*	.34*	-.02	1	
5. N	4.02	1	-.19	.15	.74	.45*	-.14*	-.43*	-.06	1
6. O	5.23	.76	-.07	-.15	.72	-.38*	.54*	.36*	.32*	-.14*

*p<.01 PSA= Public Speaking Anxiety, A = Agreeableness, E = Extraversion, C = Conscientiousness N = Neuroticism, O = Openness to experience

As seen in Table 1, public speaking anxiety and the five dimensions of the five-factor personality traits appear to have good reliability. Public speaking anxiety is negatively correlated with extraversion (r = -.47; p <.01), openness to experience (r = -.38; p <.01), conscientiousness (r = -.15; p <.01) and agreeableness (r = -.15; p <.01) while positively correlated with neuroticism (r = .45; p <.01). When the correlations between the personality traits are examined, it is seen that the highest level of correlation is between openness to experience and agreeableness (r = .54; p <.01). There is a negative correlation between extraversion and neuroticism (r = -.44; p <.01). There is a positive correlation between extraversion and openness to experience (r = .36; p <.01).

Table 2. *Multiple regression analysis results related to the prediction of pre-service teachers' public speaking anxiety*

Outcome	Predictor	Estimate B	Estimate β	t	p	Partial r	Tolerance	VIF
PSA	Agreeableness	.28	.11	2.61	<.01	.11	.638	1.56
	Extraversion	-.46	-.28	-6.55	<.01	-.28	.691	1.45
	Conscientiousness	-.18	-.11	-2.82	<.01	-.12	.824	1.21
	Neuroticism	.51	.28	6.88	<.01	.29	.763	1.31
	Openness to experience	-.69	-.26	-5.83	<.01	-.25	.607	1.64
	Gender	-3.5	-,12	-3.38	<.01	-,15	.903	1.10
	Constant	86.96		24.70	<.01			

R = .62, R²= .37, F=51.56, Durbin Watson= 1.921, PSA = Public Speaking Anxiety

It was found that the multiple regression model, in which public speaking anxiety is the dependent variable and five-factor personality traits are the independent variables, is significant (F =51.56, p <.01). According to the results of the multiple regression analysis, neuroticism (β = .28) and agreeableness (β = .11) positively predicted public speaking anxiety, while openness to experience (β = -.26), extraversion (β = -.28) and conscientiousness (β = -.11) negatively predicted public speaking anxiety. Gender also predicted public speaking anxiety (β = -.12). Female pre-service teachers reported more public speaking anxiety. The multiple regression model including five-factor personality traits and gender as predictors explained 37% of the variance in public speaking anxiety (R = .62, R^2 = .37), suggesting that these variables collectively have a substantial predictive effect.

Discussion, Conclusion and Recommendations

The current study shows that extraversion negatively predicts public speaking anxiety. According to the five-factor theory, extroverted individuals are people who have social skills and entrepreneurial interests and like to participate in team sports and club memberships (McCrae and Costa Jr., 2008). This basic tendency allows extroverted individuals to communicate with more people and gain more experience in communication. As a result of these experiences, public speaking is likely to become a more controllable and familiar skill for an extroverted individual. Additionally, extroverted individuals want to be at the centre of attention (Wilt and Revelle, 2016). Therefore, knowing that a group of people are paying attention and listening to him/her seems to be an effective way to meet this desire of an extroverted individual. Therefore, it can be thought that public speaking is perceived by extroverts as an opportunity to meet a desire rather than an anxiety-inducing action. Introverted individuals prefer silence and solitude (Feist and Feist, 2008). These characteristics may lead to fewer communication experiences and avoidance of public speaking.

Openness to experience negatively predicts public speaking anxiety. According to the five-factor theory, individuals with high openness to experience have broader interests, can try different careers, and prefer more diverse life experiences compared to those with low openness to experience (McCrae and Costa, 1985). Speaking in public is an experience that is not routine and not very probable to experience in daily life. It is possible that individuals who are open to experience have experienced public speaking more often than those who are not open to experience. Thus, they may have reduced their anxiety as a result of the experience. For example, pre-service teachers who have done public speaking before feel less anxious than those who have not (Özkan and Kınay, 2015). Individuals who are not open to experience are people with a low sense of curiosity. Therefore, gaining public speaking experience may not be as important for them as individuals who are open to experience. As a result of this lack of experience, public speaking may be perceived as a more anxiety-inducing skill for individuals who are not open to experience.

The current study shows that neuroticism positively predicts public speaking anxiety. Individuals with high levels of neuroticism are emotionally highly reactive and have difficulty returning to normal after emotional outbursts and are also prone to negative emotions such as anxiety, stress and depression (Feist and Feist, 2008). For this reason, neuroticism, along with introversion, can be seen as a subcomponent of speaking anxiety (Beatty et al., 1998). It can be said that individuals with high levels

of neuroticism feel anxiety more intensely when speaking in public. On the other hand, it can be thought that the anxiety felt affects neurotic individuals much more quickly. When feeling anxious, individuals can do various exercises to keep their anxiety under control. However, neurotic individuals may be less successful in regulating emotions.

According to the results of the current study, conscientiousness negatively predicts public speaking anxiety. Individuals with high levels of conscientiousness are more organized, self-disciplined and success-oriented to achieve their future goals (Conner and Abraham, 2001). Speaking in public is an experience that requires pre-speech preparation and practice. On the other hand, public speaking anxiety can also be experienced during the preparation process (Daly et al., 1995). Those with high anxiety cannot also conduct the necessary preparation processes in a healthy manner. Individuals who are highly conscientious but experience public speaking anxiety may want to control their anxiety by preparing in a punctual, goal-oriented and organized manner. However, it seems that individuals with a low level of conscientiousness do not show the necessary interest and attention to the preparation process before the speech due to the effect of these characteristics, and this increases their anxiety levels.

Another finding of the current study is that agreeableness positively predicts public speaking anxiety. According to the five-factor theory, individuals with high agreeableness are accepting, easy-going and reliable. People with a low level of agreeableness are suspicious, critical and unfriendly (Feist and Feist, 2008). When we look at people with social anxiety, we can see that they try to fit in with other people, nodding their heads and smiling. Their aim is to leave an acceptable image (Leary, 2010). Therefore, these individuals may try to adjust and focus more on themselves with the idea of being agreeable. Thus, it can be thought that they experience public speaking anxiety with the fear of not being able to meet the expectations of the audience they are speaking to. Since trying to be agreeable requires paying more attention to behaviours and internal processes, focusing more on oneself and trying to adjust can lead to public speaking anxiety.

Another result of the study is that women experience higher public speaking anxiety than men. The fact that women experience social anxiety disorder more often (Asher and Aderka, 2018) supports this finding. When the reasons for this situation are considered, it is first thought that women, compared to men, have a higher physiological predisposition towards anxiety due to their neurochemical connections (Behnke and Sawyer, 2000). On the other hand, it can be thought that culture has an impact on individuals' public speaking anxiety levels. It is possible to see attitudes that prevent women from improving their speaking skills in collectivist cultures, including that of Turkiye (Chantal et al., 2017). These can be reasons why women want to speak in public as much as men but cannot (De Paola et al., 2021). Women frequently face societal stereotypes that cast doubt on their assertiveness and competence, especially in professional and public settings. This social environment may amplify the stress and anxiety they experience during public speaking, as they may worry that their performance could confirm these negative stereotypes, thereby increasing their public speaking anxiety (Lintner and Belovecová, 2024).

Various suggestions can be made based on the results and limitations of the current study. Firstly, the pre-service teachers' anxiety levels were assessed using quantitative self-report measures, which capture only perceived anxiety rather than actual anxiety experiences. Future research could employ qualitative methodologies, such as interviews or focus groups, to explore deeper insights into the specific triggers, thought processes, and contextual factors that increase anxiety during public speaking tasks among pre-service teachers. Additionally, identifying specific personality traits of pre-service teachers can be valuable. Educational institutions, particularly education faculties, could develop targeted intervention programs aimed at enhancing the communication skills of students who are more introverted or exhibit higher levels of neuroticism. Such targeted interventions may reduce these students' anxieties associated with social interactions and public speaking, ultimately contributing positively to their academic and professional performance. Moreover, future studies might benefit from examining dimensions of personality, such as openness to experience, conscientiousness, and agreeableness, through mediation or moderation models. For example, these traits may predispose individuals to public speaking anxiety through concepts such as perfectionism, cognitive flexibility and irrational beliefs. This broader approach could offer a more comprehensive understanding of the

multifaceted relationship between personality and public speaking anxiety, leading to the development of more holistic and effective anxiety-reduction strategies.

Several limitations should also be considered. Since this study adopts a correletional design, causal inferences about the relationships among personality traits, anxiety, and public speaking cannot be conclusively drawn. Longitudinal studies are needed to better understand the directionality and potential causal mechanisms underlying these relationships. Another limitation of the study is the unequal gender distribution in the sample, with a considerably higher number of female participants compared to male participants. This imbalance may have influenced gender-based comparisons and limits the generalizability of the results across genders. Furthermore, this study is limited to pre-service teachers from specific educational faculties, thus restricting generalizability to different contexts or cultural backgrounds. Expanding the sample to include diverse educational settings and cultural contexts could enhance the external validity and applicability of the findings.

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