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Relationship between Democratic Attitudes and Attitudes Toward Implementing Cooperative Learning: A Cross-sectional Study of Pre-service Science Teachers

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Abstract

Pedagogical methods shape students' grasp of democracy. Cooperative learning, by fostering democratic values in classrooms, empowers students for active civic participation. This approach is seen as ideal, suggesting pre-service teachers using it will hold positive democratic attitudes. This study seeks to determine how attitudes towards democracy and implementing cooperative learning differ among pre-service science teachers at various grade levels (n=207), and how these attitudes correlate with each other. Additionally, the study aims to investigate how the relationship between attitudes towards democracy and implementing cooperative learning changes across grade levels. A cross-sectional design was employed. Data was collected using the Collaborative Learning Scale to measure the attitudes towards implementing cooperative learning and Democratic Perceptions and Attitudes Scale to measure democratic attitudes. The findings revealed that pre-service teachers' year of training has no influence on their democratic attitudes and their attitudes towards implementing cooperative learning. However, participants consistently exhibited strong democratic attitudes and attitudes towards implementing cooperative learning, with a non-significant increase across grade levels. These findings suggest a widespread support for democratic principles in future classrooms and a belief in the value of cooperative learning as an instructional approach and their high expectations of success when using this method. Furthermore, there is a strong, positive correlation between democratic attitudes and attitudes towards implementing cooperative learning at all grade levels. This means that pre-service teachers who value democratic principles in the classroom are more likely to view cooperative learning strategies favorably. These findings highlight a strong link between pre-service science teachers' democratic values and their openness to using cooperative learning. The correlation coefficient increases with higher training years. As pre-service science teachers progress through their training program, the focus on democratic education practices might increase.

Keywords: Democratic attitudes, Cooperative learning, Pre-service science teachers

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Introduction

Many countries have made sacrifices to establish democratic societies. However, holding elections is not enough to ensure a sustainable democracy. Equipping future generations with the necessary skills and values is crucial for democracy to thrive. Schools should prioritize teaching rights, responsibilities, and essential values for citizenship in a democratic society. A democratic and inclusive classroom encourages student involvement in decision-making, fostering responsibility and a conducive learning environment (Knight, 2001; Roberts & Owens, 2012). Equipping students with essential skills for unbiased learning is crucial for promoting diversity and civic engagement.

Cooperative learning encourages active student participation through face-to-face collaboration, ensuring high levels of engagement. This approach promotes an egalitarian and compassionate democratic society by allowing students to contribute (Johnson & Johnson, 1994; Cunat, 1996). According to Johnson and Johnson (2016), pedagogical methods in schools significantly impact students' understanding of democracy, emphasizing the importance of embodying democratic principles in classroom and school environments. When teachers employ cooperative learning methods, they foster democracy classrooms, leading to the emergence of a democracy stance (Vinterek, 2010) within these educational environments (Ferguson-Patrick, 2014). These classrooms employ inclusive teaching methods like cooperative learning to promote participation and reduce exclusionary practices (Florian & BlackHawkins, 2011). These classrooms also foster improved student-teacher relationships through inclusive teaching methods, leading to better gender equality attitudes and more favorable perspectives on immigrants' and ethnic rights (Sampermans, 2019).

Based on the idea that cooperative learning creates democratic classrooms, it is expected that pre-service teachers who apply this method will have positive democratic attitudes. Therefore, a strong relationship may exist between pre-service teachers' democratic attitudes and their attitudes toward implementing cooperative learning. In this context, preservice science teachers' democratic attitudes can support cooperative learning by fostering an environment grounded in values such as participation, equality, and respect among students in the classroom. This study aims to uncover the relationship between pre-service science teachers' democratic attitudes and their attitudes toward implementing cooperative learning and how this connection varies across different grade levels.

Democratic Attitudes

Democracy is the expression of the will of the people, involving active participation in governance and society. It is underpinned by values like honesty, human rights, equality, justice, security, and tolerance (Köse, 2009). Open-mindedness and effective communication are key traits for individuals in democratic societies (Genç & Kalafat, 2007). Attitude encompasses an individual's feelings and behaviors towards themselves or the events and situations around them (İnceoğlu, 2010). A democratic attitude entails embracing values such as equality, freedom, and justice within the legal

framework, signifying principles like respect for human rights, tolerance, equality, and benevolence integrated into one's lifestyle (Demirsöz, 2010). The development of this attitude commences in the family and is fostered in educational institutions through influences from parents, family members, school peers, and teachers (Köse, 2009).

Johnson and Johnson (2016) highlight the significance of a classroom and school climate that embodies democratic principles. A democratic classroom environment entails active student involvement, emphasizing its significance for future democratic societies (Ferguson-Patrick, 2022). Cunat (1996) defined democratic education as " the vital and dynamic process of a learning community that recognizes and validates the individuality and responsibility of each participant" (p. 130), aiming to develop skills essential for fostering a just society upholding human rights. By instilling these values in the classroom, it cultivates responsible citizens capable of contributing to an unbiased learning environment within a just democratic society. Thus, fulfilling the aims of democratic education should be considered central to the purpose of schooling; incorporating a "democratic way of life" into educational institutions is crucial (Apple & Beane, 2007).

Teachers' teaching methods, questioning practices, their interactions with students, and their attitudes of support or hindrance can have an impact on students' psychological well-being (Dilekmen, 1999). Duman (2010) suggests that the development of pre-service teachers' democratic attitudes correlates with a positive shift in their views on modern educational philosophies. These philosophies prioritize a more democratic, student-centered approach to education. Educators who embrace these principles can utilize various teaching strategies such as collaborative, project-based, problem-based, and inquiry-based approaches to promote active student participation (Şimşek et al., 2009). Creating interactive environments in the classroom is key for allowing students to realize their gains from learning in a more democratic setting. Teachers are encouraged to give students responsibility in the education process and foster an environment of respect and trust within the classroom (Dilekmen, 1999). However, to foster a democratic and inclusive educational environment that promotes student success, teachers should embody the principles of democracy as an integral part of their daily lives (Çankaya & Seçkin, 2004). Teaching strategies based on the constructivist approach emphasize active student participation and increased responsibility for learning. Pre-service teachers expected to use this approach should embody democratic values to effectively impart these values in the classroom while following the science education curriculum adopted in Turkey (Ministry of National Education [MoNE], 2018).

Studies in the literature show that the democratic attitudes of teachers or pre-service teachers are related to gender (Demir & Arslan, 2021; Genç & Kalafat, 2007), educational philosophical beliefs (Çelik et al., 2022; Kumral, 2014; Sönmez Ektem, 2019), self-efficacy beliefs (Çelik et al, 2022; Topkaya & Yavuz, 2011), critical thinking dispositions of students (Turabik & Gün, 2016), teaching level (Demir & Arslan, 2021), communication skills (Tas, 2018), emotional intelligence (Ozaslan et al.

2020), social justice beliefs (Kılıçoğlu & Şentürk, 2021) and locus of control (Kesici, 2008). On the other hand, considering the positive effects of contemporary teaching methods on democratic attitudes of students (Çinici & Demir, 2010; Erbil & Kocabaş, 2018; Erdogan, 2021), it is important to investigate the relationship between pre-service teachers' attitudes towards the implementation of these teaching methods and their democratic attitudes.

The Relationship between Cooperative Learning and Democracy

The relationship between democracy and cooperative learning can be understood within the framework of social interdependence theory, which outlines positive (cooperative), negative (competitive), and no interdependence. When goals are positively interdependent, collaboration thrives as individuals support one another. Conversely, negative interdependence breeds competition, where people hinder each other's progress. In the absence of interdependence, interaction itself might be lacking. When two people interact, cooperation may arise under specific circumstances outlined by social interdependence theory. These include positive interdependence, individual responsibility, supportive interaction, interpersonal skills, and group evaluation (Johnson & Johnson, 2009). *Positive interdependence* involves group members sharing a common fate through interrelated outcomes, which is fundamental in cooperative learning and important for individuals in a democratic society. Members of this society are united in their pursuit of common goals, including support for the constitution, knowledge of societal issues, and maintenance of democratic government. Emphasizing these shared objectives highlights the idea of a collective destiny with mutual benefits or consequences (Johnson & Johnson, 2016).

Another key element of cooperative learning is *individual accountability*, empowering each member as an independent and capable individual by completing tasks, mastering material, and assisting other group members. In a democratic society, individuals are required to embrace personal responsibility in fulfilling the duties of citizenship by engaging in the democratic process, upholding laws, defending the nation, participating in communities, and recognizing elected government (Johnson & Johnson, 2016).

The third fundamental element is *face-to-face promotive interaction*. Students can succeed by assisting, supporting, and encouraging each other's learning efforts (Johnson & Johnson, 2009). In democracies, citizens support and aid each other in fulfilling their responsibilities and achieving local and national goals. Supporting the success of all citizens' efforts involves the assumption that all citizens are of equal value regardless of gender, ethnicity or religion and should be treated equally under the law (Johnson & Johnson, 2016).

The fourth critical element involves the *appropriate use of social skills* such as conflict management, leadership, communication, trust building and decision making (Johnson & Johnson, 2009). In a democratic society, individuals are expected to use and master social skills. These skills

encompass leading at both local and national levels, fostering and upholding trust among all citizens, communicating effectively, making high-quality decisions, and resolving conflicts in constructive ways.

The fifth key element involves *group processing*, which pertains to examining the processes that members use to maximize their own and others' learning in order to identify ways for improvement. In democracies, engaging citizens in reflective discussions about the effectiveness and enhancement of the democratic process is essential. This encompasses creating fairer campaigns and elections, improving the effectiveness of elected representatives at local and national levels, as well as strengthening safeguards for citizens (Johnson & Johnson, 2016).

Citizenship in a democracy is largely rooted in a belief in the core values of democracy. According to Johnson and Johnson (2000), democratic values are more effectively instilled through cooperative, rather than competitive or individualistic, situations. Kirschenbaum (1994) further emphasizes that cooperative learning can significantly shape students' value development. Values such as self-respect, mutual respect, equality and fraternity inherent in cooperation also uphold democracy (Johnson & Johnson, 2000). In summary, cooperative learning groups can be considered as a microcosm of democracy, where citizens collaborate to make decisions about their own affairs. Likewise, in cooperative learning groups, students work together towards common goals and bear responsibility by participating in the collaborative process and fulfilling their roles. In both settings, all members are seen as equals. Moreover, in cooperative learning groups and democracies, members possess both the right and the duty to share their thoughts and opinions. Typically, decisions are made based on majority rule following a thorough evaluation of all perspectives. Individuals are expected to contribute to the group's goals by using their social skills appropriately cooperative learning groups necessitate that learners harmonize their personal needs with those of their peers and the overall group, cultivating a sense of community and moral connection among members striving for collective learning objectives (Johnson & Johnson, 2016).

Empirical studies have also shown the significant impact of cooperative learning in creating democratic classrooms. For instance, Ferguson-Patrick (2012) analyzed the case study of a teacher named Jill, who developed an inclusive democratic classroom through CL. The results showed that her democracy stance was reinforced and she fostered a classroom culture that was respectful, tolerant and inclusive. Similarly, Erbil and Kocabaş (2018) found that applying the cooperative learning method had a positive impact on the students' attitudes toward democracy in an elementary 3rd-grade life studies course. In another study by Ferguson-Patrick (2022), teachers reported that cooperative learning helped create a democratic classroom environment and promoted inclusivity and democratic values in education. Additionally, Malazonia et al. (2023) discovered that collaborative teaching enhanced acceptance of different groups and cultures among secondary students while promoting respect for diverse views. Likewise, other studies have also demonstrated that cooperative learning enhances

democratic attitudes in social studies, chemistry and biology courses (Çinici & Demir, 2010; Şahin & Uslu, 2017; Vacheishvili, 2015).

The teacher's role in cooperative learning is crucial for its success as they are responsible for structuring the essential elements linked to democracy. To bring democracy to life in the classroom, teachers should impart knowledge and exhibit a democratic stance. Stance is defined as "a way of looking at the world" (Vinterek, 2010, p. 368). A democratic stance involves a mindset that aligns with democratic attitudes and values, relevant to teachers who are committed to human rights, social justice and intercultural sills (Ferguson-Patrick, 2022). On the contrary, research indicates that cooperative learning is not as commonly implemented by teachers as expected (Abramczyk & Jurkowski, 2020; Sadıkoğlu et al., 2022; Tamimy et al., 2023). Similarly, studies show that pre-service teachers do not value cooperative learning as much as other pedagogies and have moderate self-efficacy in using this method (Ruys et al., 2010; Weinberger & Shonfeld, 2020). However, the beliefs and attitudes of teachers and pre-service teachers towards the method are linked to their inclination to use it (Abrami et al., 2004; Huang, 2016). Therefore, this study aims to contribute to identifying the variables that account for the tendency of pre-service science teachers to utilize cooperative learning in their future classrooms by uncovering the relationship between their attitudes towards democracy and implementing cooperative learning. Moreover, it seeks to understand how this relationship evolves throughout their undergraduate education. In line with these objectives, the research questions guiding the study are as follows:

1. How do pre-service science teachers' attitudes towards democracy vary by grade level?
2. How do pre-service science teachers' attitudes towards implementing cooperative learning vary by grade level?
3. What is the relationship between pre-service science teachers' attitudes towards democracy and their attitudes towards implementing cooperative learning?
4. How does the relationship between pre-service science teachers' attitudes towards democracy and their attitudes towards implementing cooperative learning vary by grade level?

Method

This study utilized a cross-sectional design, a type of survey methodology. In cross-sectional survey research, it is aimed to determine the current situation at one time (Büyüköztürk et al., 2018). In this study, pre-service science teachers' attitudes towards democracy and implementing cooperative learning are examined according to different grade levels. The data for this study were gathered during the spring semester of the 2023-2024 academic year.

Participants

Two hundred and seven pre-service science teachers (age 18-25 years) at an urban university in southern Turkey were selected for the study using convenience sampling. Volunteers from the existing group participated and completed an informed consent form. Among the pre-service teachers, 72.9% were female (n=151) and 27.1% were male (n=56). Additionally, 26.6% of the participants were in the first grade (n=55), 22.2% in the second grade (n=46), 26.1% in the third grade (n=54), and 25.1% in the fourth grade (n=52). All the students reported using cooperative learning in their pedagogy courses and science-based courses including laboratory classes.

Instruments

The data was gathered using the Collaborative Learning Scale and Democratic Perceptions and Attitudes Scale, which were administered through Google Forms. Prior to completing the scales, students provided information about their gender, grade level and whether they had used cooperative learning in their undergraduate courses.

Cooperative Learning Scale

The Cooperative Learning Scale, originally named the Cooperative Learning Implementation Questionnaire (CLIQ), was developed by Abrami et al. (2004) to examine teachers' expectations and beliefs about implementing cooperative learning. The CLIQ comprised 48 items grouped under expectancy, value and cost categories. The expectancy items explored how teachers perceive the connection between their use of strategy and anticipated results, including aspects such as internal attributions (self-confidence, ability) and external attributions (student traits, classroom atmosphere, support from colleagues). Value items assessed how much teachers viewed the cooperative learning and its outcomes as valuable, including benefits for both the teacher (alignment with teaching beliefs, professional growth) and the students (improved academic performance, better attitudes, enhanced social skills). The cost items consider the perceived psychological and physical challenges required for implementation, which may act as deterrents to adopting the innovation, including factors like classroom setup time, exertion, and the need for specialized materials. The Cronbach Alpha was 0.74 for the value category, 0.86 for the expectancy category, and 0.87 for the cost category. It was adapted into Turkish by Kadan (2022) as the Cooperative Learning Scale for pre-service teachers by removing 11 items. Respondents evaluate the items on a 5-point Likert scale ranging from "1. strongly disagree" to "5. strongly agree," with options for "2. disagree," "3. undecided," and "4. agree" in between. The higher the score on the scale, the more positive students' views are toward implementing cooperative learning. Kadan reported a Cronbach Alpha reliability coefficient of 0.80 for the 37-item Cooperative Learning Scale. In this study, the reliability coefficients for the value, expectancy, and cost categories were found to be 0.84, 0.75, and 0.74 respectively. The overall scale demonstrated high internal consistency with a coefficient of 0.89.

Democratic Perceptions and Attitudes Scale

The study utilized the "Democratic Perception and Attitude Scale," a 36-item scale developed by Tutkun and Genç (2013), to evaluate the levels of democratic attitudes among pre-service teachers. The scale consists of three subscales aiming to determine the “personal”, “educational” and “professional” readiness of pre-service teachers regarding their perceptions and attitudes towards democracy. The personal readiness dimension includes 11 items related to being self-critical, cooperative, open-minded, tolerant and sensitive, believing in equality and justice, respecting individual rights, adaptability, progress and developing problem-solving techniques. The educational readiness dimension involving 11 items encompasses engaging in research, analysis and synthesis as well as working effectively with individuals of diverse ideologies, religions, nationalities, gender and races while also focusing on respecting others and self-expression in an educational setting. The professional readiness dimension consists of 14 items measuring skills in democratic teaching, including collaborating with colleagues; demonstrating fairness and openness towards students; respecting students' rights; questioning teaching skills; employing various techniques, methods, and activities in teaching; fostering a positive classroom environment; efficiently managing the classroom; and providing feedback to students. All three sections of the scale utilized a 5-point Likert-type scale for responses, ranging from strongly disagree to strongly agree. The maximum possible score on the Democratic Perception and Attitude Scale is 180.

Exploratory factor analysis was performed on each of the three subscales to determine construct validity, while Cronbach's Alpha coefficient was employed to evaluate internal consistency. The analysis revealed that the subscales consisted of valid items with sub-factors. The Cronbach's Alpha values for personal, educational, and professional readiness subscales were 0.725, 0.811, and 0.897 respectively; indicating good internal consistency. The overall scale demonstrated high internal consistency with a coefficient of 0.93. Moreover, in this study sample, the Cronbach's Alpha value was found to be 0.96, indicating excellent reliability.

Data Analysis

The data was analyzed using IBM SPSS Statistics 25 software with a significance level set at 0.05. Parametric tests were applied to analyze the data, which was confirmed to be normally distributed. Preservice science teachers' democratic attitudes and their attitudes towards implementing cooperative learning were compared across different grade levels using a one-way analysis of variance (ANOVA). The relationship between democratic attitudes and attitudes towards implementing cooperative learning was explored using Pearson product-moment correlation coefficient. Initial analyses were conducted to confirm adherence to the assumptions of normality, linearity, and homoscedasticity. To explore variations in this relationship based on grade level, separate correlation coefficients were computed for each grade level and compared.

Results

One-way ANOVA results indicate that there was no significant difference in pre-service science teachers' democratic attitudes based on grade level for the first research question [$F(3,203)=0.927$, $p>0.05$)]. The results of the ANOVA for the Democratic Perception and Attitude Scale scores are shown in Table 1.

Table 1. ANOVA results for the Democratic Perception and Attitude Scale scores

Source	Sum of Squares	df	Mean square	F	p
Between groups	759.979	3	252.326	0.927	0.429
Within groups	55245.00	203	272.143		
Total	56001.98	206			

Table 2 presents the descriptive statistics of the democratic attitudes across grade levels. Although there is an increase in mean scores from the first to the second year, as shown in Table 2, this increase is not statistically significant.

Table 2. Descriptive statistics of the democratic attitudes across grade levels

Grade level	N	Mean	SD
1	55	156.54	15.82
2	46	160.67	14.22
3	54	161.11	16.91
4	52	157.96	18.49

ANOVA for the Cooperative Learning Scale data showed no significant difference in preservice science teachers' attitudes towards implementing cooperative learning across different grade levels for the second research question [$F(3,203)=2.355$, $p>0.05$)]. ANOVA results are given in Table 3.

Table 3. ANOVA results for the Cooperative Learning Scale scores

Source	Sum of Squares	df	Mean square	F	p
Between groups	1623.377	3	541.126	2.355	0.073
Within groups	46654.36	203	229.824		
Total	48277.74	206			

Table 4 presents the descriptive statistics of the attitudes towards implementing cooperative learning across grade levels. Although there is an increase in mean scores from the first to the second year, as shown in Table 3, this increase is not statistically significant.

Table 4. Descriptive statistics of the attitudes towards implementing cooperative learning across grade levels

Grade level	N	Mean	SD
1	55	132.72	15.82
2	46	139.76	14.22
3	54	137.44	16.91
4	52	139.25	18.49

The Pearson correlation test results indicated a strong, positive relationship between the two variables, with a correlation coefficient of $r=0.565$, $n=207$, $p<0.01$, showing that higher levels of democratic attitudes were associated with greater inclination towards implementing cooperative learning. Cohen (1988) proposed that Pearson r values of 0.10, 0.30, and 0.50 signify small, medium, and large effect sizes, respectively. The correlation coefficients were found to be also significant when calculated separately for each grade level. Pearson correlation test results for grade levels are shown in Table 5. Based on the results in Table 5, there is a strong correlation between the variables at each grade level, and the correlation coefficient tends to increase as the grade level increases.

Table 5. Results of Pearson correlation tests indicating the relationship between democratic attitudes and attitudes towards implementing cooperative learning for grade levels

Grade level	N	r	Sig. (2-tailed)
1	55	0.500	0.000
2	46	0.553	0.000
3	54	0.590	0.000
4	52	0.612	0.000

Significance level=0.01 (two-tailed)

Discussion, Conclusion and Recommendations

This study investigated the pre-service science teachers' democratic attitudes and their attitudes towards implementing cooperative learning based on grade level, and explored how the relationship between these two attitudes varied across different grade levels. The first research question addressed

the effect of grade level on democratic attitudes. The study revealed that the democratic attitudes of pre-service science teachers did not significantly differ according to the grade level. This suggests that university life and pre-service teacher education may not have a significant effect on the development of democratic attitudes. The lack of significant differences in democratic attitudes across different grade levels might also indicate that the foundational values associated with democratic education—such as respect for diversity, openness to different perspectives, and emphasis on participatory learning—are introduced early and consistently throughout the teacher training program. Studies in the literature also suggest that democratic attitudes do not vary based on the grade level of pre-service teachers (Genç & Kalafat, 2007; Gozler, 2021; Onuray Egilmez, 2018). On the other hand, democratic attitudes seemed to increase slightly as students progressed towards the upper grades. A more extensive investigation could validate or refute the subtle increase in democratic attitudes. Furthermore, the democratic attitudes of the participants at all grade levels were quite high, as evidenced by the fact that the maximum score on the Democratic Perception and Attitude Scale is 180. First grade students already exhibited strong democratic attitudes, and this trend continued with a non-significant increase as grade levels progressed. High democratic attitudes across the board suggest that pre-service teachers were generally supportive of implementing democratic principles in their future classrooms. This could include fostering environments where students feel valued and heard, promoting equal participation, and encouraging critical thinking. Pre-service teachers appear to be well-prepared and likely to foster democratic values in their classrooms, which is crucial for developing students' critical thinking, respect for diverse viewpoints, and collaborative skills. Further research could explore what specific experiences or curriculum components most effectively contribute to the development of democratic attitudes. Understanding these can help in enhancing teacher training programs. Moreover, investigating how these democratic attitudes translate into actual classroom behaviors and student outcomes can provide insights into the effectiveness of pre-service training in democratic education.

The second research question concerns how the attitudes of pre-service teachers towards implementing cooperative learning vary across grade levels. The findings revealed that pre-service teachers' year of training has no influence on their attitudes, supporting the finding of Ruys et al. (2010). It could be contended that teacher training should focus more on the professional growth of pre-service teachers in relation to cooperative learning. On the other hand, although the difference between grade levels is not significant, there seems to be an increasing positive attitude towards implementing cooperative learning as grade level rises. While the trend is interesting, the lack of statistical significance suggests a need for further investigation with a larger sample size. Moreover, it is suggested to explore the reasons why attitudes might become more positive with higher grade levels. Perhaps their experiences in science education program emphasized its benefits for older students. All participants stated that they used cooperative learning in their science and pedagogy courses. The involvement in cooperative learning instruction and participation might have a positive impact on their attitudes of

cooperative learning. Indeed, research shows that using cooperative learning in pre-service teachers' undergraduate courses develops their positive attitudes about using cooperative learning (Saborit et al., 2016; Ruys et al., 2010; Veenman et al., 2002). It is also noteworthy that their attitudinal scores were high. The pre-service teachers' positive attitudes towards implementing cooperative learning demonstrate their belief in its value as an instructional approach, and their high expectations of success when using this method (Abrami et al., 2004; Veenman et al., 2002). Abrami et al. (2004) discovered that the expectancy of success seemed to be the most important factor in distinguishing between teachers who use cooperative learning and those who do not. They propose that to effectively promote the adoption of educational innovations, professional developers need to focus on boosting teachers' expectations of success. The high expectancy of success on the part of the pre-service teachers may be an indication that they are likely to use the method in their future classes. These high scores might also highlight the effectiveness of current teacher training curriculums in promoting cooperative learning as a valuable teaching strategy. It suggests that training programs are successfully instilling an understanding and appreciation of these methods among future teachers.

While the study shows a trend, further research could explore what specific factors contribute to the increase in positive attitudes as pre-service teachers advance in their training. Is it linked to more hands-on teaching experience, better understanding of pedagogical theories, or perhaps mentorship and feedback mechanisms within the training programs? Further studies could also examine how these positive attitudes towards cooperative learning translate into actual classroom practices and how effectively these practices impact student learning outcomes.

The third and fourth research questions address the relationship between pre-service science teachers' attitudes towards democracy and their attitudes towards implementing cooperative learning. According to the results, there is a strong, positive correlation between democratic attitudes and attitudes towards implementing cooperative learning at all grade levels. This means that pre-service teachers who value democratic principles in the classroom are more likely to view cooperative learning strategies favorably. These findings highlight a strong link between pre-service science teachers' democratic values and their openness to using cooperative learning. This suggests that fostering democratic values in teacher training programs could lead to increased implementation of cooperative learning strategies that promote student collaboration and participation in science classrooms. The significant correlation existing at each training year suggests this connection holds true regardless of the year in the pre-service program. However, the finding that the correlation coefficient increases with higher training years is particularly interesting. As pre-service science teachers progress through their training program, the focus on democratic education practices might increase. This could lead them to see a stronger connection between democratic values and the benefits of cooperative learning for fostering student participation and collaboration. Throughout the training program, pre-service teachers likely gain more experience and knowledge of various teaching strategies. With a stronger understanding of how to

implement cooperative learning effectively, teachers who value democratic principles might see it as a more viable option for promoting those values in their classrooms. Science teaching methods courses introduce pre-service teachers to teaching methods and practical experiences aligned with the constructivist approach. Designing learning environments based on the constructivist approach requires the creation of democratic classrooms (Bay et al., 2010; Oğuz, 2011). As senior pre-service science teachers take more instruction methods courses, they are likely to become better acquainted with and adopt the constructivist approach. It has been suggested that pre-service teachers who embrace the constructivist approach as a teaching-learning strategy also have stronger democratic values (Oğuz, 2011). This claim supports the result that pre-service teachers who had a more favorable attitude towards implementing cooperative learning which is based on constructivist approach had stronger democratic attitudes.

The findings also align with previous research suggesting that cooperative learning fosters democratic classrooms (Ferguson-Patrick, 2014, 2022) and cultivates democratic attitudes in students (Erbil & Kocabaş, 2018; Malazonia et al., 2023; Mitakidou & Tamoutseli, 2011; Şahin & Uslu, 2017; Vacheishvili, 2015). Pre-service who value democratic principles might see cooperative learning as a way to create a more participatory classroom environment where students have opportunities to share ideas, work together, and reach decisions collaboratively, reflecting democratic ideals. They might view cooperative learning as a valuable method for cultivating essential democratic competencies in students, including communication, collaboration, and respect for diverse perspectives. Thus, pre-service teacher programs that emphasize both democratic values and cooperative learning strategies could be beneficial in preparing future science educators. Future research could investigate the specific reasons why pre-service teachers with democratic values are drawn to cooperative learning and examine whether pre-service teachers who implement cooperative learning actually foster democratic attitudes in their students.

Limitations

It is important to acknowledge some limitations of this study. First, The Cooperative Learning Scale does not provide a definition of the cooperative learning. This could have resulted in variations in how students interpreted cooperative learning, potentially affecting the accuracy of the measurements. Furthermore, the current study relies solely on self-reported data, precluding the collection of observational data on pre-service teacher practices. This approach necessitates acknowledging the inherent limitations associated with self-reported measures in educational research (Borg, 2006). These limitations include potential biases such as social desirability, where the pre-service teachers may report their practices in a way that is perceived favorably. Additionally, self-reported measures are often researcher-defined, potentially neglecting the full spectrum of pre-service teachers' beliefs and experiences. Furthermore, such data cannot definitively capture actual classroom practices. To

strengthen the validity of future research exploring the relationship between reported beliefs and observed practices, the incorporation of observational methods and qualitative data collection is highly recommended. Moreover, the sample size of the study limits its generalizability. The specific group of pre-service teachers studied might not be representative of all pre-service science teachers. Factors like location, specific program characteristics, or chance selection could influence the results.

Policy Implications

The study provides valuable insights into education policies, particularly in the realms of democratic education and cooperative learning. The strong and consistent democratic attitudes among pre-service science teachers suggest a solid foundation for democratic principles in future classrooms. Education policies can leverage this finding by reinforcing democratic education at all training levels. This could involve incorporating democratic principles more explicitly into teacher training curricula to ensure all pre-service teachers understand and value these concepts. Additionally, offering workshops and seminars focused on democratic education to both pre-service and in-service teachers can help maintain and deepen their commitment to these values.

Given the positive attitudes towards implementing cooperative learning, policies could focus on promoting and supporting this instructional approach. This could include providing schools with the necessary resources, such as materials and training, to implement cooperative learning effectively. Ensuring that teacher training programs include comprehensive modules on cooperative learning strategies, emphasizing their benefits and practical applications, is also essential.

The strong correlation between democratic attitudes and cooperative learning indicates that teachers who value democracy are likely to favor cooperative learning. This suggests a synergistic approach where promoting one can reinforce the other. Policy implications could include designing teacher education programs that integrate democratic principles and cooperative learning strategies, highlighting their interconnectedness. Encouraging schools to cultivate a culture that values both democracy and collaboration can create an environment where cooperative learning can thrive.

The study found that while attitudes remained strong, the correlation between democratic attitudes and cooperative learning increased with higher training years. This implies a potential increase in the understanding and application of these principles as teachers progress through their training. Policy recommendations might include introducing democratic and cooperative learning concepts early in teacher training programs to establish a strong foundation from the beginning. Providing continuous support and advanced training in these areas as pre-service teachers advance in their programs can reinforce and expand their skills and attitudes.

The non-significant increase in attitudes across grade levels suggests a stable but potentially under-optimized training program. Policymakers could conduct regular assessments of teacher training

programs to identify areas for improvement in promoting democratic education and cooperative learning. Implementing feedback mechanisms where pre-service teachers can share their experiences and suggestions for enhancing training programs can also be beneficial.

Overall, the study's findings underscore the importance of integrating democratic values and cooperative learning into teacher training programs. Education policies should aim to reinforce these principles through curriculum development, resource allocation, and continuous support. By doing so, future teachers will be well-equipped to foster democratic, collaborative, and inclusive classrooms.

Conflict of Interest

Author declares no conflicts of interest.

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Ethical Statement

The study received ethical approval by the Scientific Research and Publication Ethics Committee in the Social and Human Sciences of the author's university on February 02, 2024, with decision number 15. At the beginning of the study, all participants were informed about the process and provided informed consent.

Credit Author Statement

The author assumes sole responsibility for the conception and design of the study, the analysis and interpretation of the literature, and the preparation of the manuscript.

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