PRE-SERVICE MATHEMATICS TEACHERS' INSIGHTS ON THE PHILOSOPHY OF SOCIAL CONSTRUCTIVISM AND DEMOCRACY IN MATHEMATICS EDUCATION

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ABSTRACT

This study explores the application of the philosophy of social constructivism and the principles of democracy in mathematics education among students as pre-service mathematics teachers. Involving 134 third-year students from Universitas Negeri Makassar, the research employs both quantitative and qualitative methods to analyze the understanding and implementation of these principles. The results reveal that 89.55% of students comprehend the concept of social constructivism, although its application remains limited, particularly in theoretical courses. A moderate correlation was found between gender and teaching experience with the understanding of social constructivism, while its implementation was not significantly influenced by demographic factors. The main barriers identified include student inactivity, resource limitations, and classroom management challenges. In-depth interviews with 15 students revealed that teaching experience enhances the ability to lead discussions and apply democratic principles in the classroom. This study highlights the importance of classroom management training and collaborative strategies to improve the effectiveness of social constructivism- and democracy-based learning.

KEYWORDS: social constructivism, democracy, mathematics education, teaching experience, classroom management.

1. INTRODUCTION

Mathematics education in both schools and universities often faces the challenge of students struggling to deeply understand mathematical concepts. Frequently, students resort to rote memorization of formulas and procedures without grasping the underlying principles. One promising approach to address this issue is social constructivism. This philosophy emphasizes that knowledge is constructed through social interactions between students and their environment, with teachers acting as facilitators. This concept is rooted in Vygotsky's theory, which highlights the Zone of Proximal Development (ZPD)—the range within which learners need assistance from others to grasp new ideas (Vygotsky, 1978). In this framework, mathematical knowledge is not solely an individual pursuit but is enriched through collaborative dialogue and peer interaction, along with guidance from instructors.

In addition to social constructivism, implementing democratic principles in education is also seen as a critical component of the learning process. John Dewey, a leading figure in educational philosophy, argued that education should provide students with the freedom and opportunities to actively participate, both in determining learning methods and in classroom decision-making (Dewey, 1916). Democratic learning environments not only cultivate academic skills but also develop students into critical, open-minded, and responsible individuals. In a democratic classroom, students are given the space to express their ideas, respect their peers' viewpoints, and work collaboratively to solve problems. While this approach is often associated with social sciences, it is equally beneficial in mathematics education, where open discussions and collaborative problem-solving strategies can deepen students' understanding of concepts.

Several studies underscore the relevance of both social constructivism and democracy in mathematics education. Dillenbourg (2019) emphasized that collaborative learning enables students to hone critical thinking and analytical skills through peer interaction. Similarly, Apple and Beane (2018) found that classrooms with a democratic atmosphere boost student motivation and engagement, making them feel more involved in the learning process. Additionally, Matthews (2019) noted that learning environments that value open dialogue and collaboration tend to foster deeper and more lasting conceptual understanding. However, applying these concepts requires effective classroom management, as challenges such as time constraints and teachers' capacity to handle individual dynamics often arise.

This study focuses on the application of social constructivism and democratic principles in mathematics education. It seeks to explore how these two approaches are applied in the classroom and how they influence student engagement and learning outcomes. Furthermore, the research aims to identify the benefits and challenges of applying these concepts, offering practical recommendations to improve the effectiveness of mathematics instruction through social constructivism and democratic approaches. The findings of this study are expected to contribute to the development of more inclusive and participatory educational practices.

Social constructivism and democracy have the potential to complement each other in creating a collaborative and effective learning environment. Social constructivism highlights the importance of knowledge-building through interaction and shared experiences, while democracy ensures equal opportunities for students to participate and voice their opinions. Implementing these concepts in mathematics education not only enables students to actively construct knowledge but also fosters mutual respect and responsibility within the learning community. By combining these approaches, students are not only expected to achieve academic success but also to develop into critical, participatory individuals in their broader social contexts.

2. RESEARCH METHOD

This study employed a mixed-method approach to gain a comprehensive understanding of the application of social constructivism and democratic principles in mathematics education. This approach enabled the integration of both quantitative and qualitative data, aiming to identify patterns and student perceptions more deeply. As such, the findings of the study not only reflect numerical trends but also provide relevant qualitative insights (Creswell, 2018).

The research was conducted in the Department of Mathematics, Faculty of Mathematics and Natural Sciences at Universitas Negeri Makassar. The study participants consisted of 134 third-year pre-service mathematics teachers, selected randomly from a total population of 201 students. The sample size was determined using Slovin's formula based on the population of 201 students.

$$n = \frac{N}{1 + Ne^2}$$

where:
n = Required sample size
N = Population size (201 students)
e = Margin of error (set at 5% or 0.05)
Next, substitute the values $N = 201$ and $e = 0.05$ into the formula:

$$n = \frac{201}{1 + 201(0.05)^2}$$
$$= \frac{201}{1 + 201(0.0025)}$$
$$= \frac{201}{1 + 0.5025)} = \frac{201}{1.5025} \approx 134$$

Thus, the minimum sample size required is 134 students.
The steps for randomly selecting samples from a population of 201 students are as follows:
1. Establish Simple Random Sampling: Each student in the population of 201 has an equal chance of being selected for the sample.
2. Create a List of Students: Compile a complete list of the 201 third-year mathematics education students.
3. Assign Numbers to Each Student: Assign a unique number to each student, ranging from 1 to 201.
4. Use a Random Number Generator: Utilize a random number generator (such as software like Excel or online applications) to select 134 random numbers corresponding to the students' assigned numbers.
5. Ensure No Duplicates: Ensure that each number appears only once to avoid duplication.
6. Verify and Confirm: After the random numbers have been selected, verify the chosen students and confirm their participation in the study.

The purpose of random selection is to ensure a balanced representation of mathematics education students, particularly in relation to their experiences and involvement in learning. As advanced-level students, the participants are presumed to have a relevant understanding of the teaching and learning process, especially concerning the application of constructivist theory and democratic principles.

The data for this study were collected using two main instruments: questionnaires and structured interviews. The questionnaires were designed using a 5-point Likert scale to measure various aspects of the implementation of social constructivism, the application of democratic principles in learning, as well as the benefits and challenges encountered in employing these approaches (Joshi et al., 2015). Additionally, structured interviews were conducted to delve deeper into the students' perspectives on these two approaches, focusing on their experiences and perceptions during the learning process. These interviews were conducted online via Zoom to ensure flexibility and accessibility for student participation.

The sampling procedure for the structured interviews in this study was based on purposeful sampling, as recommended by Patton (2015) and Creswell (2018). This technique was chosen to obtain in-depth insights from participants who possessed relevant understanding regarding the application of social constructivism and democratic principles in mathematics education. Although the primary sample consisted of 134 students, not all participants were required to be interviewed. Instead, students meeting specific criteria were selected, with the expectation that they could provide the most representative and in-depth information about their learning experiences.

The number of participants for the structured interviews was determined by selecting approximately 10% to 20% of the total sample. Based on this calculation, 15 to 20 students were chosen as interview participants. This number was considered sufficient to reach the saturation point, where the information obtained becomes repetitive and no longer offers significant new insights. This approach aligns with Creswell's (2018) recommendation that qualitative research interview samples typically range between 5 and 25 participants, depending on the desired depth of analysis, as well as time and resource constraints. In this study, 15 students out of the 134 samples were interviewed.

In selecting interview participants, this study used relevant inclusion criteria. Students who were actively involved in the mathematics learning process, particularly those with experience in applying social constructivism and democratic principles, were prioritized. Additionally, participants' diverse backgrounds and varying levels of understanding were also considered to ensure a broad range of perspectives during the interviews. Consequently, the selected students were expected to provide comprehensive information about their learning experiences, both individually and collaboratively.

The interviews were conducted in a structured manner using a pre-designed interview guide to ensure the coherence of the information gathered. This guide included questions related to the participants' understanding and experiences regarding the application of social constructivism theory and democratic principles in mathematics education. The information obtained from these interviews not only complemented the previously collected quantitative data but also provided contextual insights that enriched the overall analysis of the research findings.

The collected data were analyzed using both quantitative and qualitative methods. Quantitative data were analyzed through descriptive statistics using SPSS 25 to identify trends in participants' perceptions and correlations between variables. Meanwhile, the interview data were analyzed thematically following Braun and Clarke's (2019) method, aiming to identify the key themes emerging from participants' responses. This analysis allowed the research to explore how social constructivism and democratic principles influence students' engagement and understanding in mathematics learning.

This study adhered to strict ethical principles. Prior to data collection, all participants were fully informed about the objectives of the research and their right to voluntarily participate. They were also given the freedom to withdraw at any time without consequences. Participant confidentiality was guaranteed in accordance with privacy protection guidelines and individual rights. As such, this research aims to provide valuable new insights into the application of social constructivism theory and democratic principles.

3. RESULTS AND DISCUSSION

1. Research Results

a. Results of Frequency and Percentage Analysis

A total of 134 students participated in this study, revealing that the majority of respondents are female, accounting for 60.45%, while male respondents comprise 39.55%. This female predominance aligns with field observations indicating that female students are more engaged in educational programs such as "Kampus Mengajar". This active participation significantly influences their experiences and understanding of educational practices, contributing more substantially to the teaching and learning process compared to their male counterparts.

Regarding teaching experience, 52.24% of respondents have prior teaching experience, while 47.76% have not been involved in such activities. Students with teaching experience participated in programs like "Kampus Mengajar" (Teaching Campus) or internships at schools. Interviews with 15 respondents revealed that this experience enhances their understanding of the principles of social constructivism. Several respondents noted that direct interaction with students helped them appreciate the importance of collaboration and discussion in learning. Moreover, this experience enriched their awareness of the critical role of classroom management in facilitating effective learning.

The majority of students, at 89.55%, reported having heard of and understood the concept of social constructivism, while 10.45% remain unfamiliar with it. Interviews indicated that students gained this understanding through courses such as the philosophy of education, academic articles, or firsthand classroom experiences. One student emphasized that the application of social constructivism makes learning feel more relevant as it encourages interaction between students and teachers. However, some students expressed challenges in fully implementing this concept due to limitations in their classroom management skills.

The application of social constructivism in teaching varies among lecturers. Questionnaire results show that 44.78% of students indicated this method is applied "sometimes," 29.85% reported it as "often," and 25.37% stated it is "rarely" used. From the interviews, it emerged that the implementation of this method highly depends on the course and the readiness of the lecturers. Students mentioned that social constructivism is more frequently encountered in discussion- and project-based courses, while theoretical courses tend to utilize this approach less often.

Barriers to the application of social constructivism and democratic principles remain quite significant. A total of 37.31% of students identified student passivity as the primary obstacle, followed by insufficient resources (32.84%) and difficulties in classroom management (29.85%). Interviews revealed that student passivity often stems from feelings of embarrassment or fear of making mistakes when expressing their opinions. One respondent admitted feeling hesitant to participate due to concerns about being judged by peers. Additionally, limited facilities and restricted time allocation also pose challenges to implementing collaborative-based classes. Students noted that some lecturers still struggle to maintain a conducive classroom dynamic during the learning process.

Overall, the majority of students recognize the importance of social constructivism principles; however, their classroom application faces challenges. Barriers such as student passivity, resource limitations, and classroom management difficulties constitute significant hurdles. Nevertheless, students believe that consistently applying democratic principles and social constructivism can enhance engagement and learning effectiveness, provided it is supported by competent lecturers. Recommendations for improving this implementation include creating a safe classroom environment to encourage student participation, offering classroom management training for lecturers, and providing adequate resources and time to support collaborative learning. Furthermore, strengthening democratic principles in the classroom through group discussions and the selection of learning methods can boost student involvement. By employing these strategies, the effectiveness and quality of mathematics education are expected to improve further.

b. Results of Correlation Analysis

Based on the correlation analysis between several key variables in this study, a number of intriguing findings have been identified. First, there is a fairly strong positive correlation between gender and teaching experience, with a Pearson correlation coefficient of 0.846. This indicates that a particular gender tends to be more frequently involved in teaching activities compared to others, which may be attributed to differences in interest or the opportunities available to students from various backgrounds.

Furthermore, there exists a moderate positive relationship between gender and understanding of social constructivism, with a correlation coefficient of 0.422. This finding suggests that gender differences may influence how students comprehend the concept of social constructivism in learning contexts. However, the correlation between gender and the application of social constructivism is only 0.024, indicating that there is almost no significant relationship between the two. This suggests that the implementation of constructivist methods in the classroom is relatively uniform and not influenced by the students' gender.

The analysis also reveals a moderate positive correlation of 0.357 between teaching experience and understanding of social constructivism. Students with teaching experience tend to have a deeper understanding of social constructivism than those without such experience. Nonetheless, the application of social constructivism in learning was found to have no significant relationship with teaching experience, as evidenced by the very low correlation coefficient of 0.003. This finding suggests that, although teaching experience is present, it does not automatically enhance the implementation of constructivist methods in the classroom.

Additionally, the correlation analysis indicates that student inactivity in the learning process does not have a significant relationship with the application of social constructivism. In other words, the barriers to student participation do not constitute a dominant factor affecting the extent to which social constructivism is applied in the classroom. This reinforces the notion that the application of this method does not rely solely on how active or passive students are in the learning process.

Overall, the findings of this research indicate a moderate positive relationship between gender and understanding of social constructivism, as well as between teaching experience and understanding of social constructivism. However, the application of social constructivism is not directly influenced by teaching experience or gender differences. Furthermore, student inactivity does not significantly affect the application of constructivist methods. These findings emphasize that the successful implementation of social constructivism requires more inclusive strategies and specific training, without being entirely dependent on demographic factors or individual experience.

c. Results of Thematic Analysis

The majority of students, specifically 89.55%, understand that social constructivism emphasizes the importance of interaction and collaboration between students and teachers in building understanding. Students report learning this concept through articles, courses such as philosophy of education, and programs like Kampus Mengajar. In interviews, several students highlighted that this approach makes learning more meaningful, as it allows them to learn from peers rather than solely from lecturers. However, not all students feel comfortable applying this theory in practice, especially in theoretical learning contexts. This indicates that while their understanding of social constructivism is fairly good, its application remains somewhat idealistic and not fully connected to classroom practice.

Teaching experience plays a crucial role in reinforcing understanding of social constructivism. Approximately 52.24% of students have teaching experience through programs like Campus Mengajar, internships, or tutoring, which enhances their appreciation for the application of social constructivism. Interviews revealed that direct classroom experience provides practical insights into the importance of collaboration. Students who have taught observed firsthand how social interaction helps peers grasp concepts more effectively. They also recognized the challenges that arise in applying this theory, such as variations in students' abilities and difficulties in managing discussions to remain productive. This underscores that practical experience is vital in bridging theory with real-world application.

The application of social constructivism by lecturers varies across different courses. About 44.78% of students stated that lecturers apply this method "sometimes," while 29.85% indicated it is applied "often." Interviews disclosed that this method is more commonly found in project-based and group discussion courses. However, in theoretical courses, lecturers tend to rely more on lecturing. Students feel that time constraints and lecturers' lack of skills in managing collaborative classrooms pose significant challenges to the implementation of social constructivism. Some lecturers seem to be unfamiliar with this teaching method, leading to suboptimal application.

Students understand the principle of democracy in learning as the opportunity to participate actively and express opinions without discrimination. Interviews indicate that this principle instills confidence in students and encourages greater involvement in the learning process. However, not all students experience consistent application of this principle across all classes. Some students expressed that lecturers still dominate decision-

making, limiting student participation to certain activities. Furthermore, there are concerns that some students hesitate to speak up in class for fear that their opinions will not be valued or heard by lecturers and peers.

Barriers to the implementation of democracy and social constructivism include student passivity, limited resources, and classroom management difficulties. Students noted that passivity often stems from shyness and a lack of self-confidence. In an interview, one student admitted to frequently feeling afraid to express their opinions due to concerns that their answers might be incorrect or insignificant. Additionally, time constraints and large class sizes make it challenging for lecturers to apply collaborative teaching methods. Not all lecturers possess adequate classroom management skills, making it a distinct challenge to ensure every student is actively engaged in the learning process.

Students believe that consistent application of social constructivism and democratic principles can enhance their engagement and motivation in learning. They noted that collaboration with peers and the freedom to express opinions make mathematics learning more enjoyable and help them understand concepts better. However, interviews also revealed that the implementation of these two principles requires readiness from both lecturers and students. Without adequate support, such as sufficient time and lecturers' skills in managing classrooms, the application of these principles may become ineffective, potentially leaving some students behind in the discussion process.

Overall, the results of this analysis indicate that students have a good understanding of social constructivism and democratic principles, particularly among those with teaching experience. However, their application faces several challenges that need to be addressed. To enhance the effectiveness of implementing these principles, training for lecturers in classroom management and collaborative teaching methods is essential. Furthermore, students should be given more opportunities and support to actively participate in the learning process. With these strategies, it is hoped that mathematics learning can become more inclusive, collaborative, and effective, providing maximum benefits for all students.

d. Results of Cross-Tabulation Analysis

The cross-tabulation analysis reveals distinct patterns in the understanding and application of social constructivism between male and female students. Female students place a greater emphasis on the importance of active discussion in learning, while male students tend to focus more on group collaboration. Among the 134 respondents, 60% of females and 50% of males reported having implemented the principles of social constructivism in their classrooms. Notably, students with teaching experience were more likely to rate the application of social constructivism as very important (74%). Interviews indicated that group work facilitates students' comprehension of abstract concepts such as calculus, and the freedom to engage socially encourages active student participation. This engagement is a crucial factor in fostering a deeper understanding in the classroom.

The semester of study and teaching experience also play significant roles in the application of democratic principles. Fifth-semester students reported more frequently that their lecturers often provide opportunities for discussion and expression of opinions (75%), particularly among those with teaching experience (65%). Conversely, students without teaching experience expressed greater hesitation and discomfort in participating actively in discussions, with 35% feeling fearful of making mistakes when sharing their views. Interviews revealed that teaching experience enhances confidence in leading discussions, and students believe that offering the freedom to choose topics can significantly boost engagement in the learning process.

There is a notable difference between male and female students regarding obstacles to implementing democratic principles and social constructivism. Males more frequently cite resource and time limitations as the primary barriers (60%), whereas females are more likely to identify student passivity as a challenge (65%). Overall, 70% of respondents from both genders acknowledged that difficulties in classroom management represent a major issue. During interviews, students noted that even when discussions are initiated, some peers remain reluctant to participate, and managing time becomes challenging when discussions extend longer than planned.

Students with a profound understanding of social constructivism are more inclined to view student passivity as the greatest obstacle (68%), while those with a limited understanding predominantly cite resource limitations as a challenge (55%). Interviews with students who have teaching experience indicate that the application of social constructivism and democracy necessitates more sophisticated classroom management strategies. A substantial 72% of them acknowledged that encouraging active student engagement requires time and specific skills. This

suggests that a better understanding of social constructivism allows educators to focus more on interactive solutions to address student passivity.

Teaching experience also enhances the application of democratic principles in the classroom. Seventy-five percent of students with teaching experience feel more comfortable facilitating open discussions and group deliberations. In contrast, 58% of students without teaching experience prefer direct instruction from their lecturers. Interviews corroborate these findings, revealing that students with teaching experience are more confident in guiding discussions, while free discussion requires time to develop argumentative skills. These findings indicate that teaching experience strengthens students' democratic skills, creating a more inclusive and participatory learning environment.

In summary, this cross-tabulation analysis demonstrates a significant influence of gender, teaching experience, and semester on the understanding, application, and barriers to implementing social constructivism and democracy in education. Female students are more prominent in utilizing group discussions, while male students are more focused on teamwork. The application of democratic principles appears more optimal among fifth-semester students, where lecturers provide greater opportunities for student participation. Teaching experience enhances the understanding and application of these two principles, positively impacting student engagement and readiness to tackle classroom management challenges.

The most significant barriers encountered in the implementation of social constructivism and democracy are student passivity and difficulties in classroom management. Students with teaching experience are more capable of applying these principles but still face challenges in motivating their peers to engage actively. Resource and time limitations also pose constraints for students without teaching experience. This analysis underscores the importance of collaborative learning and open discussions in enhancing educational effectiveness. Practical exercises and direct experience are crucial for optimally implementing democratic principles in mathematics education and creating a participatory learning environment.

e. Comprehensive Conclusion of Data Analysis Results

This study involved 134 students and found that the majority of respondents were female (60.45%), who actively participated in educational programs such as "Kampus Mengajar". This active participation of female students significantly impacted their understanding and experiences in educational practices, including the application of social constructivism principles. In terms of teaching experience, 52.24% of the students reported having prior experience, particularly through programs such as internships or tutoring. Interviews with 15 respondents indicated that this teaching experience reinforced their understanding of the importance of collaboration in learning, as well as emphasized the necessity of classroom management skills for effective learning processes.

A substantial majority of respondents (89.55%) grasped the concept of social constructivism, which they acquired through coursework, academic articles, and direct classroom experiences. Students reported that social interaction enhanced the relevance of their learning and enriched their understanding. However, the application of social constructivism was not uniform, with only 29.85% of respondents stating that lecturers frequently implemented it, while 44.78% noted that this method was used only occasionally. From the interviews, students affirmed that the implementation of social constructivism was more commonly observed in project-based and discussion-oriented courses, whereas in theoretical courses, this approach was rarely applied. Obstacles such as student passivity (37.31%), lack of resources (32.84%), and difficulties in classroom management (29.85%) often emerged as primary constraints in applying this principle.

Correlation analysis revealed a strong positive relationship between gender and teaching experience, with a Pearson coefficient of 0.846, indicating that teaching experience was more frequently found among certain groups. A positive correlation was also observed between gender and understanding of social constructivism (0.422), although the relationship between gender and its application in the classroom was not significant (0.024). Additionally, teaching experience exhibited a moderate correlation with understanding of social constructivism (0.357), although its application did not show a significant relationship. These findings suggest that the implementation of social constructivism does not depend on demographic factors such as gender or teaching experience, but rather on the strategies and readiness of lecturers as well as classroom conditions.

From the interviews and thematic analysis, it was found that students with teaching experience possessed a deeper understanding of the importance of social interaction in learning. Practical experience enabled students to see how collaboration and discussion could enhance student comprehension. Nevertheless, challenges such as differences in student abilities and time management posed difficulties for students in implementing collaborative learning.

Some students reported struggling to participate actively in discussions due to fear of making mistakes or concerns that their opinions would not be valued. Conversely, the application of democratic principles in the classroom provided space for student participation, although this was not consistently practiced by lecturers, who sometimes still dominated decision-making.

Cross-tabulation analysis showed that female students emphasized active discussion in class, while male students tended to focus on group collaboration. Fifth-semester students, particularly those with teaching experience, reported more frequent applications of democratic principles and social constructivism. However, students without teaching experience felt hesitant to participate in discussions due to fears of making mistakes. Additionally, there were differences in obstacles based on gender, with males more frequently citing resource and time limitations as primary constraints, while females reported facing more issues with student passivity. Classroom management challenges also emerged as barriers for the majority of respondents, indicating a need for more inclusive teaching strategies.

In summary, although most students possess a solid understanding of social constructivism and democratic principles, their implementation still faces several challenges. Teaching experience has proven beneficial in reinforcing students' understanding and skills in applying both principles; however, obstacles such as student passivity, resource limitations, and classroom management skills need to be addressed. Therefore, training for lecturers in classroom management and collaborative teaching methods is necessary to create a more participatory learning environment. Furthermore, students should be supported to become more confident in participating and expressing their opinions. With the right strategies and support, it is hoped that the principles of social constructivism and democracy can be implemented more effectively, making mathematics education more inclusive and meaningful.

2. Discussion of Research Findings

The discussion of the research findings reveals several significant discoveries that resonate with previous studies and theories related to social constructivism and democratic principles in education. Firstly, the finding that the majority of students engaged in education are female, who are more actively participating in programs such as "Kampus Mengajar," aligns with earlier research indicating that women are generally more inclined towards fields of education and teaching. This is consistent with findings by Khosa (2023), who highlighted that women tend to actively participate in collaborative learning environments and educational programs due to their higher engagement with professional advancement opportunities in education. Similarly, Eccles and Wigfield (2002) found that women are more likely to engage actively in collaborative learning environments. Recent work by Chand (2024) echoes this pattern, observing that female students more often report positive experiences with relationship-building in academic settings, which enhances their motivation and engagement in collaborative tasks . This supports the findings of this study, which indicate that female students are more focused on active discussion, while male students tend to emphasize teamwork within groups. Social constructivism theory, as articulated by Vygotsky (1978), also underscores the importance of social interaction in learning, which appears to be practiced more frequently by females in the context of this research.

The teaching experience possessed by 52.24% of the respondents evidently influences their understanding and application of social constructivism. This finding is consistent with prior research that demonstrates how practical teaching experiences, such as internships and the "Kampus Mengajar" program, assist students in developing better pedagogical skills and classroom management (Darling-Hammond, 2010). Recent findings by Lebbakhar (2023) further reinforce that teaching experience enhances teachers' ability to apply collaborative learning models, manage diverse classroom dynamics, and integrate constructivist principles more effectively in real-world teaching contexts. Chand (2024) also noted that teaching experience plays a crucial role in developing the ability to foster collaboration among students and manage the challenges of diverse learning needs. In this regard, this research supports the notion that teaching experience enriches students' conceptual understanding and practical skills in applying collaborative learning methods.

However, the implementation of social constructivism in this study appears to face various challenges, as reflected in the results from interviews and questionnaires. Barriers such as student inactivity, resource limitations, and difficult classroom management align with previous studies that also indicate teachers often struggle to consistently apply constructivist approaches, particularly in large classes or when lacking resource support (Windschitl, 2002). This also highlights the challenges faced in effective classroom management, especially when instructors are less trained in utilizing interactive learning strategies, which is reinforced by theories emphasizing the importance of good classroom management in social constructivist learning (Marzano, 2003). The findings by

Chand (2024) suggest that classroom management difficulties persist even in well-supported educational settings, especially when student engagement is low or when instructors lack specific training in constructivist methods.

Another finding indicates a correlation between gender and teaching experience, but a minimal correlation between gender and the application of social constructivism in the classroom. This is intriguing when compared to previous research. This study confirms that although females are more frequently involved in education and possess a better understanding of social constructivism, the application of such methods is not directly influenced by gender. This contradicts some studies that suggest women are more likely to adopt collaborative pedagogical approaches (Li, 2009). However, these findings also support the idea that the implementation of pedagogical strategies is more significantly influenced by factors such as teaching experience, instructor readiness, and classroom dynamics than by demographic factors like gender.

Moreover, the role of teaching experience in enhancing students' democratic skills in leading discussions and group deliberations aligns with the democratic learning theory proposed by Dewey (1916). Students with teaching experience exhibit greater confidence in directing discussions and facilitating participation from their peers, which is a hallmark of democratic learning. However, the finding that students without teaching experience feel hesitant to participate and fear making mistakes suggests that the application of democratic principles in the classroom is uneven. This is further supported by studies emphasizing the need for better training for students in communication and participation skills (Brookfield & Preskill, 2005). Chand (2024) also highlights that democratic engagement in learning improves student outcomes but requires deliberate practice and skill-building for students to overcome barriers such as fear of judgment.

Overall, the findings of this research align with social constructivism and democratic learning theories while also revealing various practical challenges in their implementation. The constraints identified, such as student inactivity and resource limitations, are consistent with previous findings, indicating that despite a solid understanding of the importance of social constructivism, its application still requires enhanced support through teacher training, effective classroom management, and improved learning facilities. A comparison with existing theories and prior research demonstrates that the successful implementation of social constructivism and democratic principles in education necessitates more inclusive strategies, ongoing pedagogical training, and adequate resource support.

4. CONCLUSION

This study has explored the integration of social constructivism and democratic principles in mathematics education among pre-service teachers at Universitas Negeri Makassar, focusing on students' understanding, experiences, and challenges in applying these concepts. The findings indicate that although 89.55% of students demonstrate a strong conceptual understanding of social constructivism, the practical implementation remains inconsistent, especially in theoretical courses. While a moderate correlation exists between gender and teaching experience, the application of these pedagogical strategies is not significantly determined by demographic factors but rather by the instructors' readiness and the classroom environment.

The results emphasize that teaching experience plays a crucial role in deepening students' grasp of social constructivism and enhancing their capacity to implement democratic principles in the classroom. Students with teaching experience reported increased confidence in leading discussions and facilitating collaborative learning, highlighting the value of experiential learning in bridging theoretical knowledge with practical application. However, barriers such as student passivity, limited resources, and challenges in classroom management emerged as significant constraints to the consistent application of these approaches.

This study underscores the necessity of classroom management training and collaborative learning strategies to optimize the effectiveness of social constructivism and democracy-based education. Moreover, the findings suggest that a safe and inclusive learning environment—where students feel comfortable expressing opinions and participating in discussions—can significantly enhance engagement and learning outcomes. The research also reveals that implementing these pedagogical frameworks requires not only well-prepared lecturers but also institutional support, including sufficient resources and time allocation, to foster a participatory learning culture.

While the integration of social constructivism and democracy holds promise for creating meaningful and inclusive mathematics education, this study highlights the importance of addressing systemic challenges. It is recommended that educational institutions prioritize professional development programs focusing on collaborative teaching methods and adaptive classroom management strategies to overcome the obstacles identified. Additionally, future

research could benefit from expanding the scope of investigation across multiple institutions and cultural contexts to validate these findings and explore new insights into the implementation of these pedagogical principles.

In conclusion, the effective application of social constructivism and democratic principles in mathematics education requires a synergistic effort from educators, students, and institutions. By fostering an environment that promotes collaboration, respect, and open dialogue, educators can not only enhance students' academic achievements but also prepare them to become critical, responsible, and engaged members of society. This study contributes to the growing body of literature advocating for inclusive educational practices, affirming that the fusion of social constructivism and democracy has the potential to transform the way mathematics is taught and learned, ultimately leading to more meaningful and enduring learning experiences.

5. ACKNOWLEDGEMENT

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