
Enhancing Creative Thinking Character through a Participatory Approach in Secondary School Mathematics Teachers in Jakarta

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Abstract

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The implementation of this community service aims to improve secondary school mathematics teachers' creative thinking skills by fostering a more creative, innovative learning process. The method of this community service consists of problem analysis, coordination, and obtaining permission from schools, and socializing materials related to improving character and creative thinking through interactive and innovative approaches. The results of the activity show an increase in teachers' creative thinking through a participatory approach in this community service program, as reviewed under the aspects of innovation, "flexibility of ideas" and "originality of ideas". The percentage increase in the innovative character of teachers' creative thinking is 87.5% (very good criteria). The percentage increase in the "flexibility of ideas" aspect is 81.24% (very good criterion). The percentage increase in the "originality of ideas" criterion is 84.37% (very good). Overall, the community service program aimed at improving teachers' creative thinking through a participatory approach is running well. This program aligns with character education that is already innovative, effective, and creative. The implication of this community service program is the improvement of creative thinking characteristics in teachers through a participatory approach to being able to create an effective, innovative, and sustainable learning environment.

Introduction

Creative thinking is a key competency for educators in designing innovative, effective, and engaging learning. In the learning context, creative performance is influenced by several factors, including psychomotor skills,

cognitive abilities, and creative self-efficacy (Huang et al., 2019). Creative character influences teachers' creative thinking dispositions, which mediate how teachers design creative learning environments (Ayyildiz & Yilmaz, 2021). Specifically, creative learning environments, giftedness, and innovative teaching foster students' creative thinking in the classroom (Hidajat, 2022; Sak, 2004). Therefore, developing and enhancing teachers' creative thinking patterns and academic practices is crucial (Fleet & Dobson, 2023). The enhancement of teachers' creative thinking must be maximized to create effective and high-quality learning experiences (Sajidan et al., 2022).

Creative thinking and teacher professionalism are two essential, interrelated components for improving the quality of learning and education in this digital era. Teachers are encouraged to think creatively when designing new, innovative, and nuanced learning processes tailored to students' characteristics, thereby enhancing students' motivation to learn and their critical thinking skills. Creative education can enhance teacher professionalism, enabling them to design learning scenarios that foster empathy and awareness in their students (Briones et al., 2022). Continuous teaching innovation from teachers and the results of creative thinking support their students' academic self-efficacy (Yao et al., 2024). Furthermore, teacher professionalism is reflected in their pedagogical, social, and personal competencies, as well as their responsibilities, all aligned with educational curriculum standards. The integration of creative thinking and professionalism makes teachers not only transmitters of material but also facilitators, motivators, and role models for students. Teachers need to understand the teaching and learning process for their students (Conkling, 2003). Therefore, strengthening the character of creative thinking and teacher professionalism is a primary need to create quality, effective, and relevant learning with current developments.

However, teachers' creative thinking skills are still low when designing innovative learning strategies. This is demonstrated by problems encountered in various schools, primarily because the learning process tends to be traditional (Alamsyah et al., 2023; Lee & Tsai, 2011). Learning does not involve teachers being creatively and actively involved in the learning process or in developing ideas through collaborative practices (Varzaneh & Baharlooie, 2015). Furthermore, previous training tended to be one-way, thus failing to foster teacher reflection and active participation in solving classroom learning problems. Furthermore, this community service program aims to enhance teachers' creative thinking through a participatory approach that positions teachers as the primary subjects in

interactive processes, discussions, training, reflection, and collaborative and innovative learning practices. A participatory approach was chosen because it can assist in decision-making, improve behavior, engagement, self-regulated learning skills, and individual creativity (Lung-Guang, 2019). Therefore, teachers are expected to develop innovative, creative, contextual, and adaptive learning strategies to meet the needs of today's digital education.

The role of teachers is crucial in designing innovative, creative learning environments that foster creative thinking among their students. A strong learning environment that supports creative learners relies heavily on teachers' creative perceptions and thinking skills (Gucyeter & Camci Erdogan, 2020). Teachers' creative thinking has an impact and is a contextual factor in the creative learning process (Hartley et al., 2016; Meintjes & Grosser, 2010). Furthermore, developing teachers' creative abilities in the educational process needs to be oriented towards competencies within the school curriculum (Nyshanova et al., 2014). Therefore, teachers' creativity can foster empathy and awareness among students (Briones et al., 2022). One creative approach used by teachers is the participatory approach.

The participatory approach is a novel solution that can be implemented in teacher professional development. The participatory approach, based on community collaboration, is effective and well implemented (Leavy, 2017). This participatory approach provides a crucial moderating and mediating role for improving creative performance (Zhu et al., 2019). As is well known, creativity development is effective in individual participatory activities (Chacón-López & Maeso-Broncano, 2023). This participatory approach positions educators and teachers as active participants in the learning and self-development process, through direct involvement in discussions, collaboration, reflection, and real-life classroom learning practices. Therefore, this participatory approach supports teachers in constructing knowledge and skills innovatively through active experience rather than simply passively receiving information.

The participatory approach chosen for this community service program (CSP) activity aims to provide teachers with the opportunity to be directly involved in every step of the activity, from problem analysis and determining solution designs through socialization of community service program; developing materials of this community service program; implementing community service program with the theme of enhancing creative thinking characteristics through a participatory approach by teachers; and participating in reflection activities. Based on the community service program of socialization on enhancing creative thinking characteristics through a participatory approach, teachers are introduced to

creative, effective, and innovative learning concepts, methods, and strategies. This community service program also stimulates teachers' creative thinking in designing innovative and engaging learning experiences, such as problem-based learning, guided discovery, open-ended problems, inquiry learning, and exploration-based learning grounded in multiple mathematical representations.

This community service program aims to support the enhancement of creative thinking characteristics through a participatory approach by secondary school mathematics teachers in the Thousand Islands [Kepulauan Seribu], Jakarta. The community service program originated from an analysis of real needs in the field, particularly regarding the limited development of creative thinking characteristics in mathematics learning at the secondary school level. Teachers play a crucial role in a quality learning process. On the other hand, teachers also play a strategic role in designing innovative and creative learning environments that are not only oriented towards achieving cognitive outcomes but also focused on developing higher-order thinking skills, including creativity. Therefore, this community service program is designed to develop teachers' creative thinking skills through a participatory approach, enabling them to play active, creative roles in the learning process and in their own innovative self-development.

Methods

This community service program (CSP) consists of a series of well-structured procedures. Participants were 32 secondary school mathematics teachers in the Thousand Islands, Jakarta. The procedures of this activity included six stages: (1) problem analysis: school observation and initial assessment; (2) coordination and permission from the school; (3) preparation of materials for socialization activities to improve teachers' creative thinking character; (4) socialization related to improving creative thinking characteristics through a participatory approach from secondary school mathematics teachers in the Thousand Islands, Jakarta; and (5) reflection and evaluation of the results of this community service activity. Specifically, this community service program is based on the theoretical approach of Participatory Learning and Action (PLA). The theory of Participatory Learning and Action (PLA) emphasizes the active involvement of participants throughout the entire process, from problem analysis and team coordination to the implementation of socialization activities and reflection, and program evaluation. The flowchart of the community service program is shown in **Figure 1**.

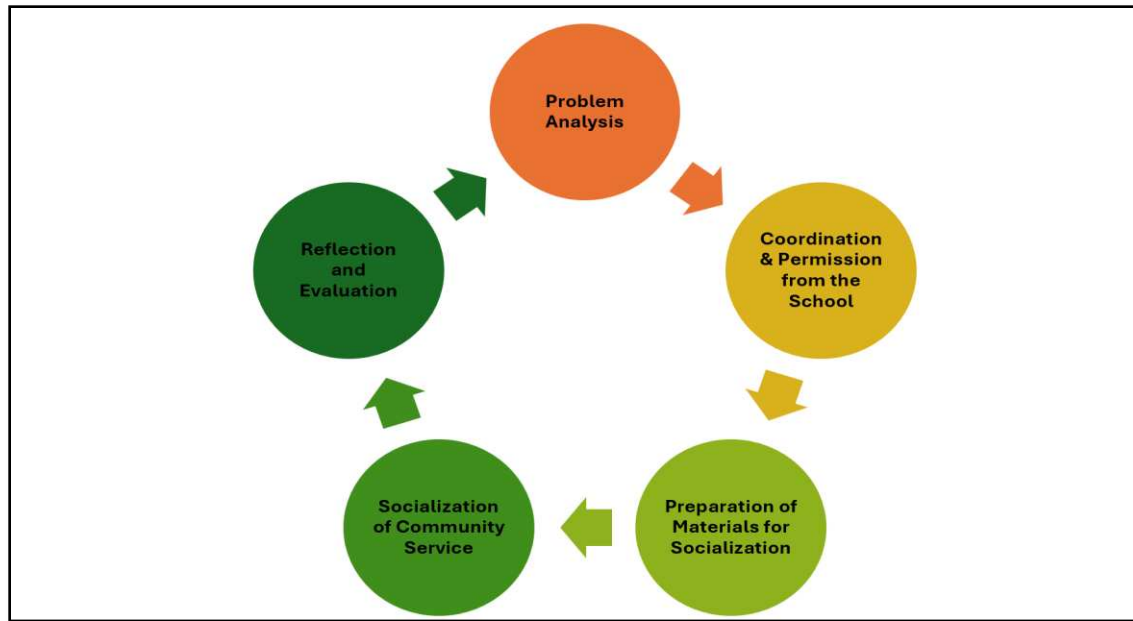


Figure 1. Flowchart of the community service program

This approach was designed to construct conducive, interactive, and innovative learning conditions and to directly improve the creative thinking character among secondary school mathematics teachers in the Thousand Islands, Jakarta. The procedures were based on the teachers' heterogeneous characteristics. The procedures for the community service program were explained as follows.

Problem Analysis: School Observations and Initial Assessment

The "problem analysis" stage focused on school observations and an initial assessment of secondary school mathematics teachers in the Thousand Islands, Jakarta. These school observations focused on classroom learning processes. The initial assessment involved distributing a questionnaire about the teachers' creative thinking characteristics in designing their learning processes actively and participatively. The questionnaire results indicated that teachers' creative thinking remained low, and they struggled to design active, innovative, and participatory learning processes. This "problem analysis" stage served as the basis for implementing outreach to improve the creative thinking skills of secondary school mathematics teachers in the Thousand Islands Jakarta.

Coordination and Permits from the Schools

Based on the results of the problem analysis and identification of participant characteristics, the team conducted formal coordination with the

schools where the community service activity was implemented. Coordination with the school involved the principal, curriculum teachers, and several class teacher representatives. This activity aimed to obtain permits to implement of this community service program and also discussed a program aligned with the creative thinking characteristics required of teachers at the school. This coordination resulted in the establishment of an implementation schedule, the determination of the location for the community service program, and the selection of the technical and equipment to be used during its implementation. Coordination and permitting with the school went well. School support was a key factor in enabling this community service activity to run effectively, well, and in a measurable way.

Preparation of Materials for Socialization

The “preparation materials for socialization” stage consists of several community service activities. These include developing materials for community service programs, such as presentation materials, interactive booklets, and contextual media aligned with teachers’ creative thinking characteristics. The community service materials include definitions of creative thinking, types of creative thinking characteristics, and their impact on Classroom learning. A participatory approach is implemented to encourage active participation in discussions, to provide diverse perspectives and new ideas, and to reflect on their teaching experiences.

Socialization of community service

The Socialization of this community service program is the core of all activities, focusing on enhancing teachers’ creative thinking characteristics through a participatory approach. This community service activity integrates participatory, educational, and innovative approaches to construct teachers’ creative thinking characteristics in designing their learning processes. The socialization activity was conducted at the Thousand Islands, Jakarta. At the beginning of the Socialization, participants were asked to complete a pre-test questionnaire. This questionnaire aims to identify participants’ creative thinking characteristics, which include three indicators: innovation, flexibility of ideas, and originality of ideas.

Furthermore, the socialization process consisted of several activities: educators delivering materials to enhance creative thinking skills; interactive, active discussions among participating teachers; and sharing experiences. Next,

they created lesson plans based on creative thinking through a participatory approach for their learning process. Participants also implemented these lesson plans during microteaching sessions. At the end of this session, non-presenting participants provided input and suggestions regarding the creation and direct implementation of the lesson plans by teachers.

Reflection and Evaluation

The “reflection and evaluation” stage aims to test the effectiveness of the community service program and identify participants’ understanding. The reflection process was conducted through discussions and participant feedback. Additionally, participants shared their experiences and impressions during the community service activity. During the evaluation stage, participants were asked to complete a post-test questionnaire to identify their creative thinking characteristics. This questionnaire aims to identify improvements in teachers’ creative thinking character through a participatory approach.

Results and Discussion

The socialization of this community service activity focused on improving teachers' creative thinking skills through a participatory approach. The results showed that teachers' creative thinking skills improved through a participatory approach in implementing community service. This aligns with previous research (Ayyildiz & Yilmaz, 2021), which found that creative personality traits positively influence teachers' creative thinking dispositions, and that these dispositions mediate a creative and innovative learning environment. The role of teacher competence and self-confidence in the teaching context significantly improves teaching quality and empowers students (Runge et al., 2023). Therefore, improving teachers' creative thinking skills can encourage more effective, innovative, and efficient learning implementation (Fleet & Dobson, 2023; Sajidan et al., 2022).

The improvement in teachers' creative thinking skills in this community service program was measured using three indicators: innovation, flexibility, and originality. This improvement was demonstrated by comparing the pre-test and post-test results. The pre-test results indicated that all three indicators of "innovation, flexibility, and originality" were very low. This is a constraint faced by teachers, and this outreach program can address these constraints. The community service program meets teachers' needs for innovation and is flexible, providing original ideas for the development of creative and innovative learning.

The participatory approach implemented in this community service program focuses on active discussions, sharing experiences, and group projects that support collaboration and cooperative attitudes as well as mutual respect for opinions. The questionnaire related to improving creative thinking characteristics uses a 5-point scale, namely very good (5); good (4); average (3); poor (2); very poor (1). The results of the questionnaire regarding the "innovative" aspect of creative thinking characteristics in the pre-test and post-test are shown in **Figure 2**.

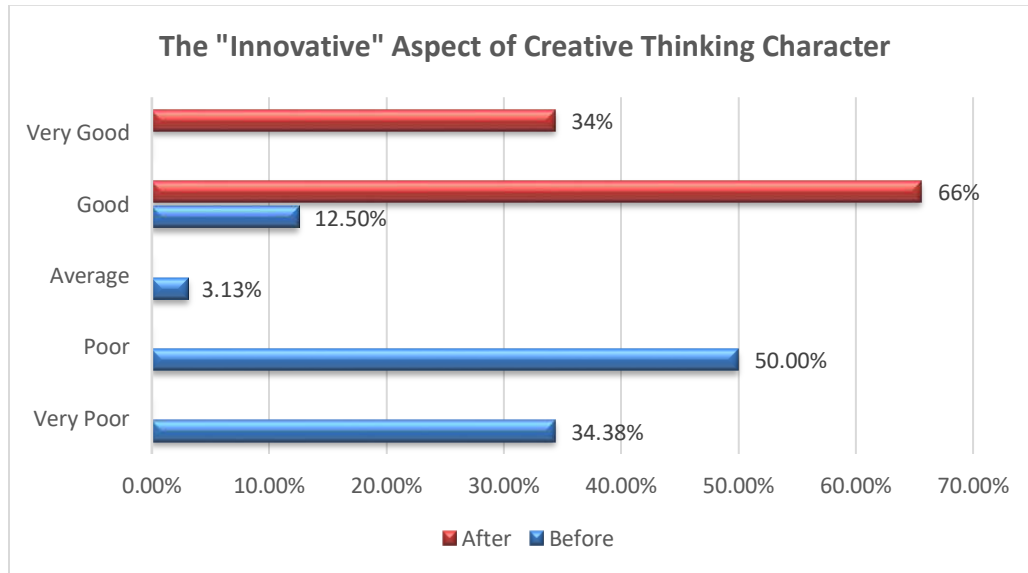


Figure 2. The “Innovative” Aspect of Creative Thinking

Based on Figure 2 and the pre-test results, the innovative aspect of teachers’ creative thinking was very low ($n = 27$, 84.38%). Teachers’ innovative aspects fell into the “very poor” category (34.38%; $n = 11$) and the “poor” category (50%; $n = 16$). On the other hand, the percentage of innovative aspects of teachers’ creative thinking, with an “average” criterion, was 3.13% ($n = 1$). Overall, teachers’ creative thinking was still predominantly categorized as “poor.” Meanwhile, teachers with good innovative qualities were 12.50% ($n = 4$). This community service program has successfully improved teachers’ innovative, creative thinking through a participatory approach. Based on **Figure 2** and the post-test results, teachers demonstrated innovation at the “very good” criterion (34%; $n = 11$) and the “good” criterion (66%; $n = 21$). The increase in the innovative aspect after the socialization of community service with a participatory approach was very significant, namely 87.5%. The innovative aspect of the teachers’ support improved their creative thinking. This is in accordance with the opinion of a previous study (Morney,

2022), namely, one of the requirements of creative thinking character is innovation in group collaboration. Continuous teacher-led innovation in teaching mediates improvements in students' academic self-efficacy and creative thinking (Yao et al., 2024).

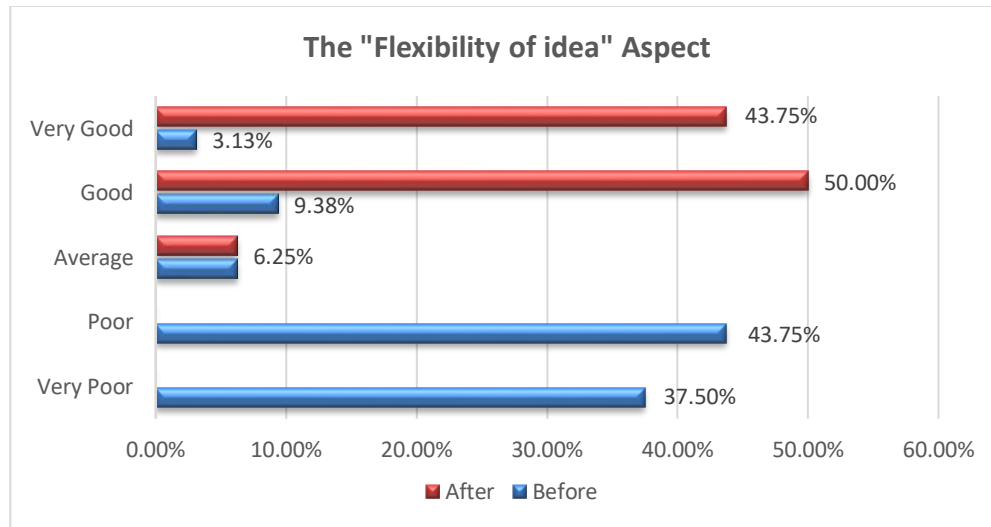


Figure 3. The "Flexibility of ideas" Aspect of Creative Thinking Character

Based on Figure 3, the “flexibility of ideas” aspect of teachers’ creative thinking shows very low levels ($n = 26$, 81.25%). Specifically, the “flexibility of ideas” aspect of teachers shows the criteria of “very poor” with 37.50% ($n = 12$) and “poor” with 43.75% ($n = 14$). On the other hand, the percentage of the aspect of “flexibility of ideas” in the character of teachers’ creative thinking with the criteria of “average” is 6.25% ($n = 2$). In addition, teachers’ flexibility in creative thinking with the criteria of “very good” before this community service program is shown by the 3.13% ($n = 1$), and the criteria of “good” are shown by the 9.38% ($n = 3$). Overall, the character of teachers’ creative thinking in the aspect of “flexibility of ideas” before the socialization of community service remains dominated by the criterion of “not good” ($n = 26$, 81.25%). This community service program has succeeded in improving teachers’ creative thinking characteristics in the “flexibility of ideas” aspect through a participatory approach ($n = 30$, 93.75%). Based on Figure 3 and the post-test results, teachers are flexible in their creative thinking, with the criteria of “very good” (43.75%; $n = 14$) and “good” (50%; $n = 16$). Meanwhile, the percentage of the “flexibility of ideas” aspect in teachers’ creative thinking characteristics, using the “average” criterion, is 6.25% ($n = 2$). The increase in the “flexibility of ideas” aspect after the socialization of community service through this participatory approach is very significant, namely 81.24%. Therefore, this community service program has succeeded in improving the

“flexibility of ideas” aspect in supporting teachers’ creative thinking. Flexibility is one of the keys to creative thinking (Bloom et al., 2014; Hooijdonk et al., 2022; Kim & Runco, 2022).

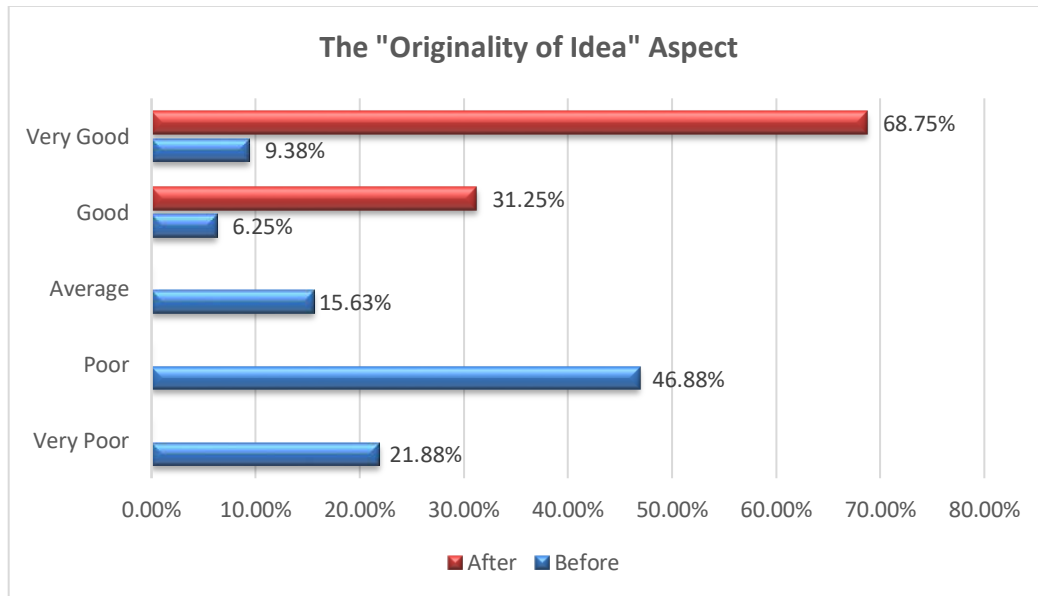


Figure 3. The "Originality" Aspect of Creative Thinking Character

Based on Figure 3, the aspect of “originality of ideas” in teachers’ creative thinking is very low ($n = 22$, 68.75%). Specifically, the aspect of “originality of ideas” of teachers shows the criteria of “very poor” with a percentage of 21.88% ($n = 7$) and the criteria of “poor” with a percentage of 46.88% ($n = 15$). On the other hand, the percentage of the aspect of “originality of ideas” in the character of teachers’ creative thinking with the criteria of “average” is 15.63% ($n = 5$). In addition, teachers can provide original ideas in their creative thinking process, with the criteria of “very good” before the community service program, shown with a percentage of 9.38% ($n = 3$), and the criteria of “good” shown with a percentage of 6.25% ($n = 2$). Overall, the character of teachers’ creative thinking in the aspect of “originality of ideas” before the socialization of the community service program is still dominated by the criteria of “not good” ($n = 22$, 68.75%). This community service program has succeeded in improving teachers’ creative thinking characteristics in the “originality of ideas” aspect through a participatory approach ($n = 32$, 100%). Based on Figure 3 and the post-test results, teachers are flexible in creative thinking, with the criteria of “very good” (68.75%; $n = 22$) and “good” (31.25%; $n = 10$). The increase in the “originality of ideas” aspect after the community service program, when socialized through this participatory

approach, was very significant, namely 84.37%. Therefore, this community service program succeeded in improving the “originality of ideas” aspect in supporting teachers’ creative thinking. The aspect of “originality of ideas” is one of the keys to creative thinking (Grossen, 2008; Massy et al., 2026; Milicevic et al., 2020). Presentation of socialization material related to creative thinking character is shown in Figure 4.



Figure 4. Presentation of Socialization Material related to Creative Thinking Character



Figure 5. Implementation of a Participatory Approach

Reflection results show that teachers actively participated in discussions using a participatory approach during the community service program themed “Improving Creative Thinking Character.” This aligns with a previous study (Daskolia et al., 2012), which found that teachers’ conceptions of creative thinking character in educational contexts are crucial in designing their learning processes. Teachers’ creative attitudes and self-efficacy have a significant positive influence on the implementation of creativity-focused teaching (Huang et al., 2019). Creative self-efficacy and teacher assessment play significant roles in students’ Classroom creativity (Briones et al., 2022; Hartley et al., 2016). Participatory approaches play a significant role in moderating and mediating creative performance (Zhu et al., 2019). Participatory learning significantly supports the development of student creativity in education (Chacón-López & Maeso-Broncano, 2023). Overall, the results of this community service program show that the participatory approach is very effective in improving teachers’ creative thinking.

Furthermore, teachers need outreach programs that focus not only on theory but also on hands-on practice to foster effective, creative, and innovative classroom learning. Teachers expect interactive, participatory, and collaborative activities that provide concrete examples of the implementation of creative learning strategies through discussions, active interaction, simulations, and collaborative development of learning tools (Clivaz & Miyakawa, 2020; Herrera-

Pavo, 2021). Furthermore, most participants expressed the need for ongoing mentoring to increase their confidence in implementing creative approaches in the classroom. Furthermore, this community service program was designed using a participatory approach that actively involved teachers at every stage, from problem analysis and group discussions to learning practices, reflection, and evaluation of activity results. This approach provides space for teacher participants to actively share experiences, express their needs, and collaboratively find more creative and innovative learning solutions tailored to the characteristics of students in their respective schools.

Conclusion

The community service program, which aimed to enhance teachers' creative thinking through a participatory approach, has been successful. The improvement in teachers' creative thinking through this community service program was measured using three indicators: innovation, flexibility, and originality. This community service program successfully increased innovation in teachers' creative thinking through a participatory approach by 87.5%. Idea flexibility also increased significantly after the community service program, reaching 81.24%. This community service program also succeeded in improving teachers' creative thinking, particularly in originality of ideas, through a participatory approach, reaching 84.37%.

Overall, the significance of this community service program lies in improving teachers' creative thinking characteristics (innovation, flexibility, and originality) through a participatory approach that actively involved teachers in discussions, training, reflection, and evaluation. Recommendations for educators and other community service implementers include the ongoing implementation of a participatory approach to socialize teachers on community service programs, making their competency development process more interactive, active, innovative, reflective, and applicable. It is recommended that community service programs further develop long-term mentoring programs that use digital learning technology or other collaborative models to achieve a more profound impact on learning innovation, creativity, and the quality of learning in schools.

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