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Optimisation of Critical Thinking, Creative Thinking, Collaboration, and Communication (4C) in the Micro Teaching Programme in the Department of Elementary School Teacher Education

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Abstract

Background: To enhance pedagogical competence, teacher education programme must develop 21st-century skills, specifically the 4C (critical thinking, creative thinking, collaborative thinking, and communication).

Objective: This study aims to optimise the implementation of the 4C skills within micro-teaching sessions in the primary school teacher education programme.

Methodology: A survey method was utilised, employing observation sheets and questionnaires as instruments. The study involved 235 students from the department of elementary school teacher education in Universitas Sebelas Maret.

Results: The findings indicate that aspects such as lesson planning and preparation, implementation, student involvement in micro-teaching, student participation, use of technology, and reflection and feedback from instructors are below 50%. Additionally, the integration of critical thinking, creative thinking, collaboration, and communication in micro-teaching sessions has yet to be achieved.

Unique Contribution: This study highlights the gaps in the current implementation of microteaching, particularly the under-integration of 4C skills, which are essential for modern educational practices.

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Conclusion: The current micro-teaching practices in the Department of Elementary School Teacher Education need to be revised to foster 4C skills among students.

Key Recommendation: Comprehensive strategies should be developed and implemented to integrate 4C skills into micro-teaching sessions, including enhanced instructor training and the use of technology to facilitate interactive and collaborative learning environments.

Keywords: Micro Teaching, Primary School, Critical Thinking, Creative Thinking, Collaboration, Communication.

Introduction

The research on optimizing 4C (Critical Thinking, Creative Thinking, Collaboration, and Communication) skills in micro-teaching programs is essential due to the pivotal role these skills play in 21st-century education (Affandy et al., 2019; Pratiwi et al., 2019; Yoel et al., 2023). The ability to think critically and creatively, work collaboratively, and communicate effectively are foundational competencies that future educators must possess to navigate the complexities of modern classrooms (Arican & Mutlu, 2023). The current study is particularly important as it addresses the existing gaps in the micro-teaching practices within the Primary School Teacher Education Program (Brahmadevara, 2023; Cari et al., 2020). By highlighting areas where current practices fall short, especially in integrating 4C skills, the research provides a clear direction for necessary improvements (Supandee & Yachulawetkunakorn, 2023). Focusing on 4C skills in the context of micro-teaching is crucial because these sessions serve as a practical platform where pre-service teachers can develop and refine their pedagogical approaches (Affandy et al., 2019; Wang et al., 2023). Integrating 4C skills into micro-teaching not only prepares future educators to foster these competencies in their students but also ensures they are equipped to handle dynamic and diverse learning environments (Iqbal et al., 2023). This focus aligns with global educational trends that emphasize the importance of holistic skill development (Coşkun & Filiz, 2023). By prioritizing 4C skills, this research aims to bridge the gap between theoretical knowledge and practical application (Teresa & Fields, 2023), ultimately enhancing the quality of teacher education and contributing to more effective and innovative teaching practices (Rojas et al., 2023).

The current landscape of teacher education faces significant challenges in adequately preparing future educators to meet the demands of 21st-century classrooms (Zhang & Zhou, 2023). Despite the recognized importance of 4C competencies, they are often underrepresented in micro-teaching programs (Karuna et al., 2022). The problem is multifaceted, involving insufficient integration of these skills into lesson planning (Shwartz-Asher et al., 2022), limited student involvement and participation (Aizenkot & Ben David, 2023), inadequate use of technology (Bijjahalli, 2020), and lack of reflective feedback from instructors (Isa et al., 2020). These deficiencies hinder the development of well-rounded educators capable of fostering a dynamic and interactive learning environment (Rinekso, 2021). Focusing on the 4C skills in micro-teaching is essential because these skills are integral to modern pedagogical practices (Perdue, 2020). They not only enhance the teaching experience but also prepare students to think critically, solve problems creatively, work effectively in teams, and communicate clearly (Pamungkas et al., 2020). By addressing these issues, the research aims to optimize micro-teaching sessions, ensuring that they effectively cultivate these vital skills in future educators, thereby improving the overall quality of education (Haryani et al., 2021).

The specific problem examined in this research is the insufficient integration of 4C skills within the micro-teaching sessions in the Department of Elementary School Teacher Education. Observations indicate that critical aspects such as lesson planning, execution, student involvement, participation, technological integration, and reflective feedback are all below 50% effectiveness. This lack of comprehensive integration of 4C skills hampers the development of essential pedagogical competencies among pre-service teachers (Gupta & Sharma, 2019). Focusing on 4C skills is vital because these competencies are foundational for effective teaching and learning in today's education landscape (Teresa & Fields, 2023). By emphasising the development of these skills in micro-teaching programs, the research aims to bridge the gap between current educational practices and the demands of contemporary classrooms (Jansen & Söbke, 2022). This focus not only enhances the teaching capabilities of future educators but also ensures they are equipped to create engaging, innovative, and collaborative learning environments for their students (Odo, 2023).

In recent years, Subramaniam (2023) has proposed and implemented various solutions to address the integration of 4C skills into teacher education programs. Research over the last seven years has highlighted several effective strategies. For instance, incorporating project-based learning and problem-based learning approaches has shown promise in fostering critical and creative thinking skills (Thangaraju & Medhi, 2023). Studies have also emphasised the importance of collaborative learning environments, where students engage in group activities that promote teamwork and effective communication (Hama & Osam, 2021). The use of digital tools and technology in micro-teaching sessions has been another significant development, enabling interactive and dynamic learning experiences (Woods, 2023). Professional development programs for instructors focusing on 4C skills have also been identified as crucial for enhancing the quality of micro-teaching practices (Zhu & Wang, 2022). Despite these efforts, challenges remain, particularly in consistently implementing these strategies across various educational contexts (Haryanto et al., 2021). Continued research and innovation are necessary to fully realize the potential of these solutions in optimizing 4C skills within micro-teaching programs (Wu et al., 2023).

While numerous strategies have been proposed to integrate 4C skills into teacher education programs, several gaps remain in the research and implementation of these solutions. Many studies have focused on isolated interventions rather than comprehensive, integrated approaches that encompass all four skills simultaneously (Wang & Wang, 2023). Additionally, there is often a lack of longitudinal studies that track the long-term effectiveness of these interventions in real-world classroom settings. The variability in educational contexts and resources also poses a challenge, as solutions that work well in one environment may not be as effective in another (Zhu & Wang, 2022). Furthermore, there is a need for more robust professional development programs that equip instructors with the necessary skills and knowledge to effectively integrate 4C skills into their teaching practices (Odo, 2023). These gaps highlight the necessity for continued research and the development of more holistic and adaptable strategies. Focusing on 4C skills in micro-teaching programs is essential because these competencies are critical for preparing future educators to thrive in modern, dynamic educational environments (Jansen & Söbke, 2022). Addressing these gaps will contribute to more effective and innovative teaching practices, ultimately enhancing the quality of education (Teresa & Fields, 2023).

The Objective of the Study

This research aims to optimise the implementation of 4C skills—Critical Thinking, Creative Thinking, Collaboration, and Communication—within the micro-teaching sessions in the Department of Elementary School Teacher Education. The research aims to address the current deficiencies in lesson planning, execution, student involvement, participation, technological integration, and reflective feedback by developing and evaluating strategies to integrate these essential skills better. The key research questions guiding this study include: How can 4C skills be effectively integrated into micro-teaching programs? How do these integrated practices impact student teachers' pedagogical competence? Why do existing micro-teaching practices fall short in developing 4C skills? By focusing on these questions, the research seeks to provide actionable insights and practical solutions to enhance the quality of teacher education programme. Emphasizing 4C skills is crucial because they are fundamental for preparing future educators to navigate and thrive in modern educational environments, fostering academic success and the holistic development of their students.

Methods

Design of the Study

This research uses a survey method to identify and analyse the optimisation of critical thinking, creative thinking, collaboration, and communication (4C) skills in micro-teaching programs (Cresswell et al., 2003). The descriptive quantitative research design aims to describe the state or characteristics of the phenomenon under study based on numerical data and statistical analysis (Patel & Patel, 2019).

Population and Sample of the Study

The population in the study were all students from the elementary school teacher education study program at Universitas Sebelas Maret. The total population consists of 600 students who are registered in the semester concerned (Åkerblad et al., 2021). From this population, the sample selected for the study was 235 students. The sample selection was done by considering adequate representation of the overall population.

Sampling Technique

The sampling technique used was purposive sampling (Cresswell et al., 2003). The purposive sampling technique was chosen because this study requires samples that have direct experience in the micro-teaching program (Tambak et al., 2023). Inclusion criteria include students who have participated in the micro-teaching program for at least one semester. The purposive sampling technique ensures that the selected sample is relevant to the research objectives and can provide in-depth information (Cresswell et al., 2003).

Instrument for Data Collection

The data collection instruments used in this study included observation sheets and questionnaires. The observation sheet was used to assess students' 4C skills during the implementation of micro-teaching, while the questionnaire was designed to collect data on students' perceptions of the effectiveness of the micro-teaching program in developing their 4C skills (Cresswell et al., 2003). The questionnaire consisted of a series of closed questions with a Likert scale by Abdullah (2015). Data collected from observation sheets and questionnaires were analysed using descriptive statistics.

Validity and Reliability of the Instrument

The validity of the instrument was tested through content validity by involving experts in the field of education to assess the suitability of the items with the concepts being measured (Cresswell et al., 2003). The construct validity test was conducted using confirmatory factor analysis. The results of the confirmatory factor analysis showed the following values: Chi-Square = 180.45, *df* = 136, CFI = 0.95, TLI = 0.94, RMSEA = 0.04, which indicates that this model has a good fit. Instrument reliability was tested using Cronbach's Alpha coefficient. The Cronbach's Alpha value was obtained as 0.86, indicating that the instrument has high reliability.

Results

Observation of Micro-Teaching Programme

The results of the observation of the implementation of the micro-teaching program are presented in Figure 1. Observations were made on 6 aspects, such as: aspect 1: teaching planning and preparation; aspect 2: implementation; aspect 3: student involvement in micro teaching; aspect 4: student participation in micro teaching; aspect 5: use of technology; aspect 6: reflection and feedback by lecturers in micro teaching courses.

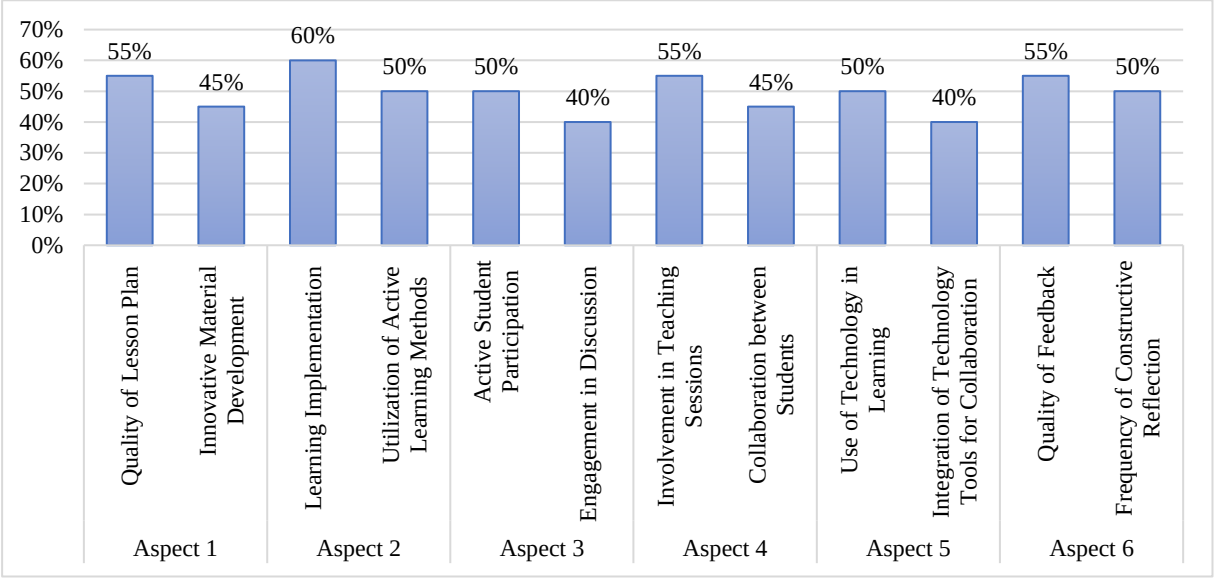

Figure 1: Percentage of Applicability

The observation results presented in Figure 1 on the sub-aspects of the implementation of the micro-teaching program and the percentage of applicability, related to the learning process of the micro-teaching program. The sub-aspect of the quality of the lesson plan was rated quite well with an implementation level of 55%, indicating that the lesson plan prepared was sufficient in supporting the learning process. The development of innovative materials was rated lower with a percentage of 45%, indicating that there is still room for the development and application of more innovative materials in learning. The implementation of learning has a high uptake of 60%, indicating that the learning process has run well and effectively. The utilization of active learning methods was at 50%, indicating that the micro-teaching program was used moderately in the learning process. Students' active participation was also at 50%, indicating that half of the students actively participated in the learning. Involvement in discussions was rated low at only 40%,

indicating that students were less involved in discussions during learning. Involvement in teaching sessions was at 55%, indicating that students were moderately involved in teaching sessions. Collaboration between students was rated lower at 45%, indicating that collaboration between students still needs to be improved. The use of technology in learning is at 50%, indicating that technology is used in learning but can still be improved further. The integration of technology tools for collaboration is rated low with a percentage of 40%, indicating that the use of technology tools to support collaboration is still less than optimal. The quality of feedback is rated good enough with a 55% uptake rate, indicating that the feedback provided has been quite helpful in the learning process. The frequency of constructive reflection was at 50%, indicating that reflection was done moderately.

The results of this study provide an overview of the implementation of the various sub-aspects in the learning process. The quality of the lesson plan and the implementation of learning showed a fairly high level of applicability, at 55% and 60%, respectively, indicating that the preparation and implementation of learning were quite good. However, innovation in material development still needs to be improved, as seen from the percentage of implementation, which is only 45%.

Questionnaire of Micro-Teaching Program Implementation

The results of the micro-teaching program implementation questionnaire are presented in Table 1.

Table 1: Questionnaire Results of Micro-Teaching Program Implementation

Aspects	Question	Achievement (%)
Aspects of Mastering the Characteristics of Learners	I understand individual differences in how my students learn.	45%
	I am able to identify the special needs of each student.	40%
	I can recognise different learning styles in my class.	38%
Aspects of Mastering Learning Theories and Principles of Educative Learning	I apply appropriate learning theories in the learning process.	42%
	I use the principles of educative learning in my teaching.	47%
	I update my knowledge of learning theories regularly.	39%
Aspects of Curriculum Development	I contribute to curriculum development in my school.	43%
	I adapt the curriculum to the needs and characteristics of my students.	41%
	I keep up with the latest developments in the education curriculum.	37%
Aspects of Educative Learning Activities	I design learning activities that motivate students.	46%
	I implement interactive and educational learning methods.	44%
	I ensure learning activities are relevant to students' daily lives.	40%
Aspect of Developing Learners' Potential	I identify the unique potential of each student	38%
	I support students in developing their talents and interests.	35%
	I provide opportunities for students to show their potential in class.	37%
Communication with Students	I communicate with students effectively and clearly.	45%
	I create a classroom environment that supports open communication.	42%
	I listen and respond well to students' needs and questions.	43%
Aspects of Assessment and Evaluation	I use a variety of assessment methods to measure student achievement.	41%
	I provide constructive feedback to students based on evaluation results.	39%

	I adjust teaching strategies based on student assessment and evaluation results.	37%

In aspects of mastering the characteristics of learners, teachers have a fairly good understanding of individual differences, but there is still room to improve the ability to identify students' special needs and learning styles. The questionnaire results on the aspect of understanding individual differences in how students learn were 45%, the ability to identify the special needs of each student was 40%, and the ability to recognise different learning styles in the classroom was 38%.

Aspects of mastering learning theories and principles of educative learning, teachers tend to use the principles of educative learning quite well, but lack in updating knowledge about learning theories. The questionnaire results on the aspects of applying appropriate learning theories in the learning process amounted to 42%, the use of educational learning principles in teaching amounted to 47%, and periodic updating of knowledge about learning theories amounted to 39%.

Regarding aspects of curriculum development, teachers participate moderately in curriculum development and adaptation but less in keeping up with the latest developments in the education curriculum. The questionnaire results on the aspects of contributing to curriculum development at school amounted to 43%, adapting the curriculum according to the needs and characteristics of students amounted to 41%, and following the latest developments in the education curriculum amounted to 37%.

Regarding educative learning activities, teachers are quite good at designing and implementing them, but they need to improve their relevance to students' daily lives. The questionnaire results on the design aspect of learning activities that motivate students amounted to 46%, the implementation of interactive and educational learning methods amounted to 44%, and the relevance of learning activities to students' daily lives amounted to 40%.

In the aspect of developing learners' potential, teachers are less than optimal in identifying and supporting the development of students' unique potential talents and interests. The questionnaire results on the aspect of identifying the unique potential of each student amounted to 38%, supporting the development of student's talents and interests amounted to 35%, and providing opportunities for students to show their potential in class amounted to 37%.

Communication with Students: Teachers are quite good at communicating with students and creating an environment that supports open communication, but this still needs improvement. The questionnaire results on aspects of effective and clear communication with students amounted to 45%, creating a classroom environment that supports open communication amounted to 42%, and listening and responding to students' needs and questions amounted to 43%.

Aspects of assessment and evaluation, teachers are less than optimal in using various assessment methods, providing constructive feedback, and adjusting teaching strategies based on evaluation results. The questionnaire results on the aspects of using various assessment methods to measure student achievement amounted to 41%, providing constructive feedback to students based on evaluation results amounted to 39%, and adjusting teaching strategies based on the results of student assessment and evaluation amounted to 37%.

The results revealed varying levels of achievement in aspects of teaching and learning, indicating a need for improvement in several areas. Teachers' understanding of student characteristics and application of learning theories are still at a moderate level, with percentages of 45% and 42%, respectively, indicating gaps in the application of educational learning theories and principles.

Discussion

Integration of 4Cs in Micro-Teaching Program

The integration of 4C skills (Critical Thinking, Creative Thinking, Collaboration, and Communication) into the micro-teaching program can be seen as a systematic effort to address the challenges identified in the research. Based on the observation, there are several aspects that show that the micro-teaching program is already at a fairly good level, such as the quality of lesson plans (55%) and lesson implementation (60%). However, there are also areas that require improvement, such as innovative material development (45%) and collaboration between students (45%). This suggests there is significant room for improving critical and creative thinking skills, as well as collaboration and communication in micro-teaching.

To integrate critical thinking skills, the development of learning materials needs to be more innovative and challenging, facilitating students to analyse, evaluate, and create solutions to problems encountered. In addition, more interactive and discussion-based learning methods can increase student engagement in discussions (currently only 40%), which is an important component of critical thinking. To improve creative thinking skills, teachers can design activities that encourage the exploration of new ideas and the use of innovative problem-solving strategies. This could be realised through collaborative projects that allow students to develop and apply their creative ideas in a real context. An increase in the use of active learning methods (50%) could also support this. Collaboration can be strengthened by creating more opportunities for students to work in teams and complete tasks together. The use of technology for collaboration (currently 40%) needs to be increased, for example, by utilising digital platforms that support teamwork and effective communication. This can also help address low engagement in discussions and teaching sessions. Communication skills can be improved through increasing the frequency and quality of feedback provided by lecturers (currently 55%). Presentation exercises, group discussions, and debates can also help students hone their communication skills.

The results of the study are in line with previous research by (Gündüzalp, 2021), who also examined 4C skills in micro-teaching, showing similarities in some findings. (Gündüzalp, 2021) found that the implementation of collaboration and communication skills in micro-teaching was still not optimal, with each aspect showing a success rate below 50%. However, (Gündüzalp, 2021) research also showed that critical and creative thinking skills were higher, with percentages of 60% and 58%, respectively. This difference may be due to variations in teaching methods and the background of the research subjects (Ghafar, 2020). Overall, integrating 4C skills into micro-teaching programs requires a holistic approach that includes developing more innovative materials, using more active learning methods, increasing collaboration through technology, and improving communication skills through constructive feedback (Gündüzalp, 2021).

Impact of Micro-Teaching Program Integration

The results of this study provide an overview of the various sub-aspects of micro-teaching implementation and show its impact on the pedagogical competence of prospective student teachers. From the observation, it can be seen that the quality of the lesson plan and the implementation of learning show a fairly high level of applicability at 55% and 60%, respectively, indicating that the preparation and implementation of learning are quite good. However, the aspect of innovation in material development, which only reached 45%, indicates that there is still room for improvement in creativity and innovation in learning. The use of active learning methods and students' active participation each stood at 50%, indicating that active interaction in learning is still at a moderate level. Involvement in discussion and collaboration between students, which only reached 40% and 45%, respectively, emphasises the need to strengthen communication and cooperation skills among student teachers. The use of technology in learning is at 50%, indicating that technology has begun to be utilised but not optimally, especially in the integration of technological tools for collaboration, which only reached 40%, indicating that technology has not been used optimally to support collaboration between students. The quality of feedback is quite good, with an uptake rate of 55%, indicating that feedback has helped the learning process, but the frequency of constructive reflection is only 50%, indicating that reflection has not been done optimally.

The questionnaire results show that teachers' understanding of individual differences and students' special needs still needs to be improved, with percentages of 45% and 40%. Mastery of learning theories and educational principles is also at a moderate level, with 42% applying learning theories and 39% updating knowledge about learning theories. Aspects of curriculum development and learning activities that are relevant to students' daily lives also show results that still need improvement, with percentages of 43% and 40%. Effective communication with students and creating a classroom environment that supports open communication also still need to be improved, with 45% and 42%, respectively. The varied aspects of assessment and evaluation, as well as providing constructive feedback, which only reached 41% and 39%, indicate the need for improvement in the use of more varied assessment methods and adjustments to teaching strategies based on evaluation results. The impact of integrated practices on student teachers' pedagogical competence is significant. Good lesson planning and implementation practices help student teachers understand the importance of good preparation and implementation in learning. However, the lack of innovation in active learning materials and methods shows that student teachers still need improvement in creativity and mastery of technology to support more interactive and collaborative learning.

The results of the study are in line with research conducted by Ghafar (2020), which shows that innovation in learning and the use of technology are essential for improving pedagogical competence. Johnson found that teachers who more frequently use innovative learning methods and technology in the classroom tend to have higher levels of student engagement and better learning outcomes. In addition, research by Akbulut & Hill, (2020) also emphasizes the importance of reflection and constructive feedback in teacher professional development. Smith points out that teachers who regularly reflect and receive feedback tend to have a better understanding of students' needs and are better able to adjust their teaching strategies (Barnett & Botes, 2022). Overall, the research results emphasize the importance of improvements in certain aspects of micro-teaching to ensure that student

teachers can develop holistic pedagogical competencies, including the ability to plan and implement innovative and interactive learning and skills in using technology and providing constructive feedback.

Implementation of Micro-Teaching Programme

The results suggest that current micro-teaching practices are less successful in developing 4C skills for several key reasons. First, innovation in material development is low, with only 45% of lesson plans being innovative. This results in a lack of stimulation for students to think critically and creatively. Secondly, the utilisation of active learning methods and students' active participation are each only at the 50% level. This shows that activities that encourage collaboration and communication have not been optimally implemented in teaching. Students' involvement in discussion and collaboration between students is also low, only 40% and 45%, respectively, which indicates that the learning environment has not supported effective and constructive interaction between students. Third, the use of technology in learning is at a moderate level at 50%, but the integration of technological tools for collaboration is still low (40%), which indicates that technology has not been maximally utilised to support collaborative learning and effective communication.

When compared to previous research by Aulia and Utami (2021), which emphasised the importance of collaboration and interaction between students in improving communication and critical thinking skills, the results showed significant gaps in the implementation of micro-teaching. Johnson and Johnson found that well-structured learning, which encourages social interaction and optimal use of technology, can significantly improve 4C skills. Meanwhile, research conducted byAkbulut and Hill, (2020)also emphasised that integrating technology and active learning is essential for developing 21st-century skills, including the 4Cs. This study shows that current micro-teaching has not fully implemented these strategies, so the 4C skills have not been well accommodated.

Furthermore, the questionnaire results show that teachers' understanding of individual differences and the application of learning theories are at a moderate level (45% and 42%). These results are in line with research conducted by Tyan et al. (2020), which emphasises that a deep understanding of student characteristics and the application of appropriate learning theories are essential for developing critical and creative thinking skills. Teachers' inability to identify and support students' unique potential and talents (38% and 35%) suggests that there are still challenges in personalising learning, which is crucial for the development of creativity and innovation skills. Overall, the results of this study indicate that to improve 4C skills in micro-teaching practice, improvements in material innovation, active learning methods, technology utilisation, and in-depth understanding and application of learning theory are required. Referring to previous research, it is important for micro-teaching to focus more on social interaction, collaboration, and optimal use of technology in order for 4C skills to develop effectively (Sari et al., 2023).

Conclusion and Recommendations

The present study found that the integration of 4C skills in the micro-teaching program is still not optimal. Although there are some aspects that are already quite good, such as the quality of lesson plans (55%) and learning implementation (60%), many areas still require significant improvement. Innovation in the development of learning materials and collaboration between students each only reached 45%, and student engagement in

discussions was even lower at 40%. The use of technology in learning is at a moderate level (50%), but not yet optimal in supporting collaboration (40%). These findings suggest that further efforts are needed to improve creativity, engagement, and collaboration in micro-teaching to better prepare student teachers to face real-world challenges.

Further research is suggested to focus on developing more innovative and interactive strategies in micro-teaching that can improve 4C skills. Experimental studies can be conducted to evaluate the effectiveness of various active learning methods and the use of collaborative technology in improving critical and creative thinking skills. In addition, further research also needs to explore how constructive feedback and more in-depth reflection can improve teaching quality and student engagement. Investigations into teachers' understanding of individual differences and application of learning theories are also important to support the development of 4C skills more holistically.

Conflict of interest

The authors hereby declare that no conflict of interest exists

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