Development of Research Competency for Pre-service Teacher in Early Childhood Education Program using Peer Coaching Process

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Abstract

**Purpose:** This semi-experimental research aimed at achieving two objectives: 1) to develop the research competency of pre-service teachers in early childhood education through the use of a peer coaching process, and 2) to compare the research competency of pre-service teachers in early childhood education before and after implementing the peer coaching process.

**Methodology:** The research sample consists of 30 second-year pre-service teachers in the early childhood education program who are enrolled in research classes in the 2021 academic year, selected through cluster random sampling. The research tools used include activities planned with a peer coaching process and a pre-service teacher research competency assessment form. The statistical analysis employed the mean and standard deviation.

**Findings:** The findings revealed that: 1) pre-service teachers demonstrated good research competency when using the peer coaching process (mean = 3.97, SD = 0.52), and 2) the research competency of pre-service teachers in early childhood education after the implementation of the peer coaching process was at a higher level (good level) compared to their competency level before the trial of the peer coaching process (fair level). The statistical significance was set at .05.

**Conclusion:** Upon closer examination, it was found that the participants exhibited good performance in all aspects, except for writing research reports and presenting research findings. Furthermore, the research competencies of the post-experimental early childhood education students were significantly higher than before the reciprocal coaching process.

**Practical Implications:** This study can be implemented in the classes to improve the competency of student's research ability by applying these coaching methods.

**Keywords:** Research Competency, Peer Coaching Process, Pre-service Teacher

Principles and reasons

Research professionals are engaged in a continuous process of learning, acquiring knowledge, analyzing information, and adapting their practices based on the insights they gain. This commitment to ongoing learning and improvement is particularly relevant in the field of science research as it contributes to the well-being of society and various social and educational institutions. Social science research findings have the potential to benefit a wide range of stakeholders involved in the education sector. Teachers, educators, administrators, policy makers, parents and other stakeholders can all derive valuable insights from research findings. These findings can be applied in multiple ways to enhance the education system. Firstly, research findings can be implemented in the classroom, influencing the teaching, and learning process to address learning gaps. By incorporating evidence-based practices, teachers can improve their instructional methods, tailor their approach to individual student needs and create more effective learning environments. Secondly, research findings can inform teacher training programs. By integration research-based strategies into teacher educating, aspiring teachers can be equipped with the latest insights and techniques to enhance their effectiveness in the classroom. This helps in developing a competent and well-prepared teaching workforce. Likewise, research findings are instrumental in shaping curriculum development programs, be considering research-based evidence, curriculum designers can create educational content and learning objectives that align with the needs of students and incorporate effective pedagogical approaches. Lastly, research finding play a vital role in formulating education policies. Policymakers can draw upon research to make informed decision regarding educational practices, resource allocation, assessment methods and other critical aspects of education system (Rathnakar, G., 2018; Pramodini, D.V., & Sophia, K.A., 2012). The design of this evidence allows for its flexibility in different educational settings, serving as a valuable resource for improving research skills in a wide range of disciplines.

Under the National Economic and Social Development Plan No. 12 (2017-2021) (Office of the National Economic and Social Development Board, 2016: 15), the focus is on improving the knowledge and skills of individuals to empower the
workforce and population. The overarching goal is to improve the quality of education at all levels and enhance learning outcomes. The National Education Plan 2017-2036 (Office of the Secretary-General of the Education Council, Ministry of Education, 2017: 110) emphasizes the need to develop individuals of all ages with appropriate skills and competencies that align with educational and professional standards. This, in turn, will improve the quality of life and maximize potential.

The education system has standardized competence and attitude based on the professional standards of educators. These standards include knowledge, experience, performance, and conduct. Of particular relevance to research is the knowledge standard, which outlines the performance criteria for research. Research can be conducted to improve teaching methods and enhance student learning outcomes. Teacher research, which involves classroom-based inquiry, can systematically address issues and challenges that arise in teaching and learning. Teachers who engage in research gain knowledge, skills, and experience, which enable them to perform their duties more effectively. Thus, it is imperative for modern teachers to appreciate the value of classroom-based research and to incorporate it into their teaching practice.

The Faculty of Education at Suan Sunandha Rajabhat University, Thailand offers a Teacher Program designed to equip pre-service teachers with the necessary skills and knowledge to excel in both research and operational performance in the classroom. The program aims to produce pre-service teachers who can fulfill the responsibilities of teachers’ task in various agencies. The primary emphasis of the teacher preparation curriculum was centered around enhancing teacher professionalism (Kulachit & Nuangkancharerm, 2022). It established a foundation for pre-service teachers to acquire knowledge and skills that align with the university’s identity, promoting their growth and competitiveness. This endeavor necessitated the utilization of knowledge, technological expertise, and teamwork to foster effective innovation in teaching and the development of learning materials. To support pre-service teachers in achieving sustained success, the authors implemented the peer coaching in to their classroom to achieve long-term success (Plailek, M.Essien and Sawangdee, 2022).

The program places a strong emphasis on the researcher characteristics of teachers, highlighting the competencies that they should possess in terms of basic research methods and techniques. The program also emphasizes the importance of developing teachers who are capable of raising researchers and promoting free thinking. The curricula and related regulations of the education system frequently underscore the importance of research education for teachers. By providing research education to teachers, the program aims to cultivate research awareness and competence among teachers, which can lead to the development of a research culture in society. Additionally, gaining scientific attitudes and behaviors is integral to creating a research-focused community that values free thinking and encourages individual development (Alsakeh, Alabdelulhadi and Alrwaished, 2017; Fletcher, 2018).

Research has shown that some pre-service teachers lack the necessary knowledge application skills, research attitudes, and skills required to conduct effective classroom research. Unfortunately, many teachers fail to apply their research findings in their own classrooms. A study on the problematic conditions of conducting workshop research in classrooms found that although many teachers are trained in workshops, the quality and value of the research they conduct in the classroom are often subpar. Teachers often lack the necessary content and methodological skills, resulting in mediocre research quality and outcomes (Saracaloglu, 2008; Sukusmai, Wiratchai, & Khemmani, 2011). These findings highlight the overall lack of research performance, knowledge, skills, and positive attitudes towards research among pre-service teachers. Research is often presented in a manner that is too abstract, which fails to link it to the actual classroom context where it can be applied effectively (Malouf & Schiller, 1995, cited in Alber & Nelson, 2002). Consequently, the performance of teachers in conducting workshop research in the classroom is not adequately enhanced.

The authors have shown a keen interest in peer coaching as a methodology to facilitate perservice teachers in developing desirable in research competency for pre-service teacher. Peer coaching serves as a means of supporting peers in mentoring one another, fostering collaboration, and enhancing the cultivation of new skills or ideas (Sider, 2019; Intasena and Nuangkancharerm, 2022). Peer Coaching has emerged as a popular intervention in education in recent years, with schools, colleges, and universities in Australia, the United Kingdom, and the USA introducing coaching programs to improve learner outcomes (Knight, 2007; Kee et al., 2010; van Nieuwerburgh, 2012). The study of One form of coaching that has gained particular attention is peer coaching, in which teachers help one another to enhance their instructional abilities.

Peer coaching empowers teachers to acquire the necessary skills and techniques needed to improve their effectiveness in the classroom. This can be achieved through co-planning learning activities, modeling effective teaching, observing peers, providing feedback, and reflecting on their observations (Zepeda et al., 2013). Research has shown that a culture of coaching can improve teaching and student learning. Many teachers have adopted new instructional strategies that have resulted in improved student outcomes under the guidance of coaches (Guiney, 2001; Chiyama, 2019). Peer coaching also supports teacher collaboration, which focuses on improving student learning outcomes. It provides teachers with opportunities to learn about classroom efficiencies and how to enhance student learning. Furthermore, in the context of higher education, peer coaching has demonstrated its effectiveness as a supportive strategy. The most impactful elements of students’ peer coaching, particularly in supporting the development
of leadership skills among their peers, encompass being nonjudgmental, active listening, fostering accountability and employing effective questioning techniques (Britton & Anderson, 2010; Matthew et al, 2020).

Peer coaching is a collaborative method of professional development that has gained widespread recognition as one of the most effective tools for promoting teacher growth and development (Goker, 2006; Britton, 2010; Hsieah, et, al., 2021). With two teachers working together, Peer Coaching promotes reflective inquiry into teaching practices and provides a potential solution for facilitating teacher growth and development in both pre-service and in-service teacher programs. In addition to peer coaching, which enhances their abilities, pre-services teachers are encouraged to develop collaborative skills in teamwork and leadership, as well as effective communication skills (Kulachit and Nuangchalerm, 2021).

In this context, the current study aims to investigate the development of research performance of students and teachers in early childhood education through the process of coaching each other. Specifically, the study aims to explore the results of the coaching process in improving the research performance of teacher students and guiding the teaching and learning of teachers in higher education. The study also aims to guide the development of teacher performance in other areas.

To achieve these objectives, a qualitative research design will be employed using a case study approach. Data will be collected through semi-structured interviews, observations, and document analysis. The participants will include teacher students and their assigned coaches, who are experienced teachers in early childhood education.

The study is significant in that it will contribute to the existing literature on Peer Coaching and its effectiveness in promoting teacher growth and development in the area of research performance. Additionally, the study’s findings will provide insights into how Peer Coaching can be utilized as a tool for professional development in other areas of teacher performance.

In conclusion, this study aims to contribute to the field of education by exploring the effectiveness of Peer Coaching as a collaborative tool for promoting teacher growth and development in the area of research performance. It is hoped that the findings of this study will inform future research in this area and support the implementation of effective coaching strategies in teacher education programs.

Research Objectives
1. To compare the research performance of early childhood education students before and after using the coaching process with each other.
2. To study the satisfaction of early childhood education students with the use of coaching processes with each other.

Below is the conceptual framework of this study:

<table>
<thead>
<tr>
<th>3-step reciprocal coaching</th>
<th>Research Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-observation meetings, conducting operations</td>
<td>1. Knowledge</td>
</tr>
<tr>
<td>2. Observations, conducting</td>
<td>2. Skills (Identifying Problems of Research, Conducting Research, Analyzing Data)</td>
</tr>
<tr>
<td>3. Meetings after observation, and conducting research</td>
<td>3. Attitude</td>
</tr>
</tbody>
</table>

Research Methodology

A qualitative research design is employed using a case study approach, Semi-structured interviews, observations, and document analysis are used to gather the data. This study involved a sample of 90 pre-service teachers enrolled in Early Childhood Education programs during the second semester of the 2021 academic year. The sample comprised 60 second-year students and 30 third-year students who were currently enrolled in research courses focused on early childhood education. These participants were selected based on their enrollment status and academic
level, which made them suitable for the study’s research objectives. The study aimed to investigate specific aspects of early childhood education, and the selected sample was deemed appropriate for this purpose. This study employed a mixed methods research design, incorporating elements of semi-experimental, quasi-experimental, and a one-group pretest-posttest design. To ensure the validity and reliability of the research instruments, qualified individuals were involved in their development and testing (Pramodini and Sophia, 2022). The research team engaged five experts with advanced qualifications in teaching educational research and specializing in measuring and evaluating studies. These experts assessed the integrity of the research content and subsequently subjected the instruments to the iterative process of improving their validity and reliability.

To collect data, three research instruments were employed. Firstly, plan activities with mutual coaching processes were utilized to provide a framework for the research participants to engage in reciprocal coaching sessions. Secondly, the Student-Teacher Research Performance Assessment was administered to measure the effectiveness of the coaching processes in improving the performance of both students and teachers. Finally, a satisfaction questionnaire was given to students and teachers to evaluate their level of satisfaction with the use of coaching processes in their learning and teaching experiences.

The researchers’ choice of these instruments was informed by the need to employ tools that are sensitive, accurate, and valid. Through a rigorous process of development, refinement, and testing, the researchers were able to demonstrate the efficacy of these instruments in capturing reliable data that provide valuable insights into the effectiveness of mutual coaching processes in educational settings.

**Findings**

Table 4.1 Average and standard deviations of research performance of student-teachers after experimenting with each other's coaching processes.

<table>
<thead>
<tr>
<th>Research Competencies</th>
<th>((x^))</th>
<th>(S.D)</th>
<th>level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowledge of research in the classroom</td>
<td>4.17</td>
<td>0.69</td>
<td>good</td>
</tr>
<tr>
<td>2. Research skills in the classroom</td>
<td>3.99</td>
<td>0.63</td>
<td>good</td>
</tr>
<tr>
<td>3. Aspects of using statistics Research findings; Summary of findings and discussion of results</td>
<td>3.87</td>
<td>0.58</td>
<td>good</td>
</tr>
<tr>
<td>4. Writing research reports and presenting research findings</td>
<td>3.76</td>
<td>0.48</td>
<td>good</td>
</tr>
<tr>
<td>5. Attitude toward classroom research</td>
<td>4.04</td>
<td>0.60</td>
<td>good</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3.97</strong></td>
<td><strong>0.52</strong></td>
<td>Good</td>
</tr>
</tbody>
</table>

* Statistically significant at .05

Based on the findings presented in Table 4.1, it can be noted that the mean and standard deviations of research performance exhibited by student-teachers following their exposure to the coaching process were satisfactory, with an average score of 3.97 and a standard deviation of 0.52. A detailed examination of the results on a case-by-case basis revealed that the student-teachers performed exceptionally well in the area of knowledge acquisition related to research in the classroom, whereas their attitudes towards conducting research in the classroom were also positive. However, the aspect of writing research reports and presenting them was identified as an area of weakness, as the student-teachers exhibited a comparatively lower level of proficiency in this domain. These results suggest that the coaching process was effective in enhancing the research-related competencies of the student-teachers, but further intervention may be necessary to reinforce their skills in writing research reports and presenting them.
Table 4.2: Average and standard deviations of research performance of students-teachers before and after experiments using a reciprocal coaching process.

<table>
<thead>
<tr>
<th>Classroom Research Competencies</th>
<th>Before experiment (x̄)</th>
<th>S.D.</th>
<th>Level</th>
<th>After Experiment (x̄)</th>
<th>S.D.</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowledge of research in the classroom</td>
<td>2.52</td>
<td>0.71</td>
<td>Intermediate</td>
<td>4.17</td>
<td>0.69</td>
<td>good</td>
</tr>
<tr>
<td>2. Classroom Research Skills</td>
<td>2.25</td>
<td>0.40</td>
<td>moderate</td>
<td>3.99</td>
<td>0.63</td>
<td>good</td>
</tr>
<tr>
<td>3. Aspects of using statistics Research findings; Summary of findings and discussion of results</td>
<td>2.31</td>
<td>0.55</td>
<td>moderate</td>
<td>3.87</td>
<td>0.58</td>
<td>good</td>
</tr>
<tr>
<td>4. Writing research reports and presenting research findings</td>
<td>2.75</td>
<td>0.48</td>
<td>Intermediate</td>
<td>3.76</td>
<td>0.48</td>
<td>good</td>
</tr>
<tr>
<td>5. Attitudes toward research</td>
<td>2.03</td>
<td>0.59</td>
<td>moderate</td>
<td>4.04</td>
<td>0.60</td>
<td>good</td>
</tr>
</tbody>
</table>

The results indicate that the overall process of using reciprocal coaches was good, with a mean score of 3.97 (S.D. = 0.52). This score is higher than the intermediate level of research performance observed prior to the trial of reciprocal coaches, which was 2.37 (S.D. = 0.50). The research competence levels of the coaches, students, and teachers during the process of using coaches with each other were moderate. However, after the experiment, the research competencies were developed to a good level. The most improved competencies were research skills, including the use of statistics, research findings, research summaries and discussions, and attitudes. Knowledge of research in the classroom and attitudes toward research also improved from moderate to good levels.

Table 4.3: Compares the number and percentage of student-teachers classified by research performance using the implementation process of coaching each other.

<table>
<thead>
<tr>
<th>Research Competency Level</th>
<th>Before experiment</th>
<th>experiment</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>0</td>
<td>26.67</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>2</td>
<td>6.67</td>
<td>13</td>
</tr>
<tr>
<td>Intermediate</td>
<td>9</td>
<td>30.00</td>
<td>9</td>
</tr>
<tr>
<td>Moderate</td>
<td>14</td>
<td>46.67</td>
<td>0</td>
</tr>
<tr>
<td>improve</td>
<td>5</td>
<td>16.67</td>
<td>0</td>
</tr>
</tbody>
</table>

As presented in Table 4.3. The research process employed the use of coaches to facilitate their research skills. Prior to the experimentation, the performance of the student teachers in this regard was reported to be at a moderate level, with 14 individuals (46.67%) demonstrating moderate competency. Improvement level was demonstrated by 5 individuals (16.67%), while good and very good competency levels were exhibited by 2 individuals (6.67%) and 0 individuals, respectively.
Following the experimentation, there was a noticeable improvement in the research performance of the student-teachers. Specifically, 13 individuals (43.33%) demonstrated good competency levels, while 9 individuals (30.00%) maintained their moderate level. Notably, 8 individuals (26.67%) demonstrated very good competency levels in research skills. These findings suggest that the use of coaches can effectively enhance the research competencies of student teachers.

<table>
<thead>
<tr>
<th>Research Competencies</th>
<th>Number of Students (N=30)</th>
<th>Mean (x̄)</th>
<th>Standard Deviation (S.D.)</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before experiment</td>
<td>30</td>
<td>2.37</td>
<td>0.50</td>
<td>1.69</td>
<td>0.00**</td>
</tr>
<tr>
<td>After experiment</td>
<td>30</td>
<td>3.97</td>
<td>0.52</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Statistically significant at .05**

Based on the results presented in Table 4.4, it is evident that the implementation of a teaching and learning process involving the use of peer coaches had a significant impact on the research performance of student-teachers. The statistical analysis conducted on the data indicated a significant difference in the research performance of the participants, with a significance level of .05. These findings suggest that the use of peer coaching as a teaching and learning strategy can enhance the research skills and abilities of student-teachers, thereby contributing to their overall academic and professional development.

Summary of the findings

The present study aimed to investigate the development of research competencies among early childhood education students before and after using the coaching process with each other. The findings revealed that the research competencies of the participants significantly improved after the reciprocal coaching process. The overall performance of the participants was good, with a mean score of 3.97 (SD=0.52). Upon closer examination, it was found that the participants exhibited good performance in all aspects, except for writing research reports and presenting research findings.

Furthermore, the research competencies of the post-experimental early childhood education students were significantly higher than before the reciprocal coaching process. The improvement was statistically significant at a level of .05, indicating that the level of research competencies among the students developed from fair to good.

Discussion

The aim of this study was to investigate the impact of a reciprocal coaching process on the research competencies of early childhood education students. The research competencies of student-teachers of early childhood education were evaluated before and after the implementation of the reciprocal coaching process. The findings indicated that the overall research competencies of the participants were good (mean=3.97, SD=0.52). This result may be attributed to the coaching process, which provided students with the opportunity to learn from their peers, receive advice from instructors, and engage in collaborative learning. These findings align with previous research conducted by Tobua (2011), which demonstrated that the development of research competencies among professional students and teachers can be facilitated using self-learning kits. In Tobua's study, learners who engaged in self-study demonstrated statistically significant improvements in their research performance (p<0.05) and expressed high levels of satisfaction with their learning experiences. According to the research conducted by Plailek, Essien and Sawangdee (2022), the assessment of per-service teachers’ competencies in knowledge, skills, and attitudes indicates that they are capable of innovative English learning across all three areas, yielding a highly positive overall outcome. Additionally, the research highlights the development of per-services teachers’ collaborative skills in teamwork and leadership.
communication skills, computer skills, and technology awareness. These competencies are fostered through the implementation of hybrid learning and peer coaching approaches.

Peer coaching, as a form of teaching practice, involves professional peers collaborating, sharing, reflecting, and providing feedback to one another to enhance their professional development and improve student learning outcomes. The present study’s findings demonstrate that peer coaching had a positive impact on the research competencies of early childhood education students-teachers. In addition, the results suggest that peer coaching can enhance teachers’ teaching motivation and self-efficacy, which aligns with previous research by Murphy (2012), Murray et al. (2009).

The results of the analysis compared the research competencies of students majoring in early childhood education before and after using the coaching process with each other. The research competencies of the students and teachers were evaluated using a standardized assessment tool. The coaching process was designed based on the teaching and learning models that focused on coaching and counseling, as proposed by Chaiyawong (2014). The coaching process was aimed at promoting the competency of primary school teachers of professional students.

The results of the study showed that the research competencies of the students improved significantly after the coaching process. The research competencies of the teachers who were involved in the coaching process were also found to be good. These findings are consistent with previous studies which have reported the beneficial results of coaching in promoting the professional development of teachers and student teachers.

For instance, studies have reported that peer coaching enables student teachers to become active learners as both teachers and coaches of fellow teachers (Goker, 2006). The present study adds to the existing literature by demonstrating the effectiveness of coaching in improving the research competencies of students majoring in early childhood education.

Furthermore, the study found that the characteristics of primary school teachers had improved from moderate to considerable. These findings suggest that coaching can be an effective tool for promoting the professional development of students and teachers in the field of early childhood education. Future studies could explore the long-term effects of coaching on the professional development of early childhood education professionals.

Prior to the coaching process, the per-service teachers had a moderate level of research competencies. However, after participating in the coaching process, they demonstrated good research performance, which was in line with the findings of Renner (2015). Renner claims that peer coaching, which involves proficient and expert mentors, can help educators in their learning and enable them to share experiences and work collaboratively to solve teaching problems.

Furthermore, the study by Chuchudsuwan and Yanprechaset (2020) showed that teachers have a strong desire to improve their research competencies in the classroom. Specifically, teachers need to develop their knowledge and understanding of how to analyze data collected from classroom research. Additionally, teachers expressed a desire to improve their skills in using statistical techniques to analyze data in a manner that is suitable for classroom research. Finally, the study found that teachers also wished to develop their creativity by conducting research in the classroom.

In conclusion, peer coaching can be an effective approach for enhancing research competencies among student-teachers. This study provides evidence that peer coaching is a valuable method for supporting educators in their learning and helping them to improve their research skills. The findings also suggest that teachers should be encouraged to develop their knowledge and skills in data analysis and statistics, which can help them to conduct meaningful research in the classroom and enhance their teaching practices.

In terms of research skills in the classroom before the coaching process, teachers exhibited a moderate level of research performance in the classroom with their students. However, after undergoing the coaching intervention, their research performance improved significantly. Based on Barkley and Baico’s (2010) study, it was found that teachers exhibited a satisfactory level of research skills in the classroom prior to undergoing a coaching process. However, after engaging in the coaching program, teachers demonstrated a significant improvement in their research skills. The authors suggest that this improvement may be attributed to the opportunities provided for teachers to practice their research skills.

In addition, Scott et al. (2012) found that peer coaching is an effective approach to learning, especially when coaches are successful in establishing trusting relationships with their peers. This finding underscores the importance of creating a positive and supportive learning environment that fosters collaboration and mutual respect among peers. The authors suggest that these conditions are crucial for facilitating effective peer coaching and enhancing learning outcomes. Peer coaching was found to positively impact the instructional and classroom management skills of lecturers, fostering improved relationships among colleagues, and promoting solidarity within the school Donmez and Sahin (2022). The study also concluded that allocating adequate time and resources, as well as providing training for lecturers on effective communication, were crucial factors for ensuring the effectiveness of peer coaching practices.

Aspects of using statistics Research findings Summary of findings and discussion of result competencies of the teacher students before the reciprocal coaching process were found to be moderate. However, after the experiment, there was a significant improvement in their research performance. The post-intervention assessment showed that the experimental group had a good level of research performance, which was in line with the Bureau of Education (2008)
and Waiyaroop, & Sivaskunraj (2022) standards. On the other hand, the control group did not show any significant improvement in their research competencies.

Regarding the aspect of writing research reports and presenting research findings, the research competencies of the student-teachers were moderate prior to the coaching process. However, after the experiment, their research competencies improved to a good level. Young researchers often struggle with writing and submitting their papers, often feeling like their research or manuscript is not good enough for publishing. However, it's important to remember that perfect papers don't exist and that good papers are the ones that are published. These papers advance the scientific discussion in their respective fields (Day, 2006). It can be seen that peer coaching can enhance individual performance, thereby encouraging individuals in their learning process.

Furthermore, the subjects' attitudes toward research were at a fair level before the coaching process. However, after the experiment, their research competencies significantly improved. This finding is consistent with the idea presented by Laowreandee (2013) regarding the role of coaches in combining their expertise with that of teachers for professional development. Coaches can support, help, facilitate, coordinate, and encourage change in teachers. Coaching is also an effective way to motivate individuals to achieve their goals and develop their skills (Arnold, 2009).

Anderson (2020) conducted a study on in-service teachers who used independent reciprocal coaching in school. The study found that mutual coaching has a positive impact on the school culture, helps develop teacher professionalism, and fosters a positive attitude towards supervision and teaching and learning development. Furthermore, peer coaching was found to provide effective support to student teachers, addressing the emotional dimension of their experience. Peer coaching has been reported to help student teachers feel more relaxed, comfortable, and confident (Fry & Hin, 2006). Moreover, student teachers reported that peer coaching helped develop a mutual sense of trust, honesty, and equality (Ovens, 2004).

Research recommendations

1. Research recommendations in this research
   Based on the findings of the study and observations by the researchers, the following are recommended:
   - To apply research findings to the coaching process and enhance the research competencies of students and teachers, it is important to consider taking strengthening actions. Specifically, students should be equipped with competencies in designing classroom research that aligns with the context of their learning activities in practical subjects.
   - To facilitate the reciprocal coaching process, it is important for students to have dedicated time for small group meetings. During these meetings, students can engage in joint activities and exchange their learning experiences, which should be tailored to the context of their group.
   - During the initial stages of the process, students should coach each other, while instructors should provide close support and guidance in conjunction with the reciprocal coaching process. This can help ensure that students receive individual assistance as needed to build their coaching competencies.

2. Recommendation for further research.
   Based on the previous discussion, a potential area for further research is recommended by the researchers.
   - Research should compare research performance by coaching process with other teaching methods.
   - A comparative study should be conducted to compare the factors that contribute to the improvement of research performance among students.
   - The role of technology in supporting reciprocal coaching and how it can be used to facilitate collaborative learning and knowledge exchange among students and teachers.
   - Identify the best practices for implementing reciprocal coaching in different educational contexts.

Policy Suggestion
The authors made efforts to minimize limitations; however, resource constraints imposed certain limitations on this study. Firstly, the data collection was limited to Thailand, and it would be valuable for future research to extend the study to other countries. Additionally, this study specifically examined research competency among per-service teachers in early childhood education programs, but future researchers could explore other factors that influence pre-service teachers in this field.
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**Funding**: To conduct this research, the authors did not avail any funding

**Conflicts of Interest**: There is no conflicts of interest among authors

**Institutional Review Board Statement**: -

**Data Availability Statement**: the results and findings of this study is available for public, besides this authors have not use any supplementary data.

DOI: https://doi.org/10.15379/ijmst.v10i4.2326

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