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Analyzing the Effects of Jigsaw Strategy on Students' Critical Thinking and Teamwork Skills

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ABSTRACT

This study investigates the effects of the Jigsaw strategy on enhancing students' critical thinking and teamwork skills in higher education, addressing the limitations of traditional lecture methods that often emphasize individual learning. Conducted at Monkayo College of Arts, Sciences, and Technology during the second semester of Academic Year 2024-2025, the research involved a quasi-experimental design with two matched sections assigned to either the Jigsaw or the lecture method. Pretest and posttest scores were analyzed to measure critical thinking, while peer ratings and teacher observations assessed teamwork skills. The results indicated a significant improvement in critical thinking and teamwork skills among students who participated in the Jigsaw strategy. Specifically, the experimental group demonstrated a notable increase in posttest scores for critical thinking, surpassing the control group, which utilized traditional lecture methods. Additionally, peer ratings revealed enhanced perceptions of teamwork skills, with students reporting greater collaboration and communication after engaging in Jigsaw activities.These findings provide valuable insights into the effectiveness of the Jigsaw strategy in fostering essential competencies crucial for academic success and employability. By highlighting the positive impact of cooperative learning approaches, this research contributes to the broader discourse on innovative pedagogical strategies in educational settings, emphasizing the need for methods that prepare students for the collaborative demands of the modern workforce.

Keywords: elementary education, jigsaw strategy, critical thinking, teamwork skills, traditior lecture method, quasi-experimental study, Philippines

INTRODUCTION

The Problem and its Background

Critical thinking and effective teamwork are essential for academic success in today's educational landscape. Traditional teaching methods often prioritize individual learning, which may inadequately support the development of these crucial skills. The Jigsaw Method is a widely used cooperative learning technique developed initially by Elliot Aronson in 1971 at the University of Texas, Austin, to promote cooperation in the classroom by making individuals dependent on each other in pursuit of a common goal (Harvard University's ABLConnect, 2025). As highlighted by Sellnow and Ahlfeldt (2005), there is a growing need for higher education to cultivate critical thinking and teamwork skills, as many students struggle to apply their knowledge in practical situations. This gap underscores the

limitations of conventional educational approaches, which frequently fail to engage students meaningfully and leave graduates unprepared for modern challenges. Therefore, there is an urgent need for pedagogical strategies that effectively foster both critical thinking and teamwork.

The study conducted in Kazan, Russia, by Plotnikova and Strukov (2019) provides compelling evidence for integrating teamwork and critical thinking skills in higher education. Their research demonstrates that collaborative learning environments significantly enhance students' abilities to think critically, engage in constructive dialogue, and apply their knowledge in practical settings. By fostering teamwork, the study highlights how students can develop essential skills such as self-criticism and the capacity to navigate complex information, ultimately preparing them to contribute meaningfully to societal and economic reforms. Critical thinking and teamwork integration is crucial for equipping future professionals with the competencies needed in today's dynamic world (Plotnikova & Strukov, 2019).

The research conducted by Basco (2020) at Batangas State University ARASOF-Nasugbu Laboratory School highlights critical issues surrounding the development of students' critical thinking and teamwork skills. The study demonstrated that using science infographics significantly enhanced academic performance among sixth-grade pupils, indicating that traditional teaching methods may not adequately foster these essential skills. While the findings revealed improvements in critical thinking abilities, information recall, and the organization of complex information, they also underscored the challenges students face in effectively communicating their knowledge and collaborating with peers. The study suggests that without innovative teaching strategies, such as the integration of infographics, students may struggle to develop the necessary competencies for teamwork and critical analysis Basco, 2020). This emphasizes the need for educational interventions that improve academic performance and address the underlying problems in cultivating critical thinking and teamwork skills among learners in Batangas, Philippines.

At Moncast, students struggle to analyze problems, generate innovative solutions, and collaborate with peers. Traditional teaching methods often focus on rote memorization, neglecting the development of critical thinking and teamwork skills (Sudrajat and Kumalasari, 2023). The Jigsaw strategy, a cooperative learning approach, has shown potential in promoting these skills through active participation and peer-to-peer interaction.

This study seeks to address this knowledge gap by analyzing the effects of the Jigsaw strategy on students' critical thinking and teamwork skills. Additionally, the effectiveness of the Jigsaw strategy in comparison to traditional teaching methods in enhancing students' critical thinking, as measured by pre and posttest scores and teamwork skills as assessed through peer ratings and observation ratings, requires further exploration.

Review of Related Literature and Studies

This section explores literature and studies relevant to the effects of the Jigsaw strategy on students' critical thinking and teamwork skills. It highlights findings from similar research to provide a clearer understanding of the topic and support the objectives of this quantitative study. Sources include manuals, journals, websites, and other scholarly materials.

Jigsaw strategy. Shehada et al. (2000) found that the Jigsaw strategy had a positive role in developing the corporation and love. The study aimed to determine how the Jigsaw method of teaching chemistry affected the motivation and critical thinking skills of female students in the tenth grade in the Al-Zarqa'a Governorates at Awjan school in Alzarqa, Jordan. The findings demonstrated statistically significant

differences between the two groups' mean scores on the motivation scale and the critical thinking test, favoring the experimental study group that used the Jigsaw method to learn the chemistry course. In conclusion, they discover that the Jigsaw approach contributed to the growth of the corporation and love.
The study conducted by Jeong (2021) investigates the integration of the jigsaw strategy within flipped learning environments to enhance the English attitude and motivation of EFL (English as a Foreign Language) pre-kindergarten teachers. The research underscores the transformative potential of flipped learning, a pedagogical approach that reverses traditional educational methodologies by having learners acquire knowledge outside the classroom while focusing on higher-order skills during in-class activities. This approach aligns with Bloom's Taxonomy, encouraging learners to progress from foundational knowledge acquisition to application, analysis, and evaluation within a collaborative setting.
To address the limitations of conventional group activities, such as unequal participation and reduced engagement, the study employed the jigsaw strategy. This cooperative learning technique assigns specific roles to learners, fostering accountability and deeper understanding of content through collaboration. Jeong (2021) findings revealed that the combination of flipped learning and the jigsaw strategy significantly improved participants' English attitudes, motivation, and skills, highlighting its efficacy in enhancing engagement and communication in EFL contexts.
Additionally, the study Jeong (2021) emphasizes the role of technology, particularly during the COVID-19 pandemic, in supporting these pedagogical strategies. Online platforms like Zoom and LMS facilitated interactive activities, enabling peer feedback and continuous learning outside the physical classroom. The study's results align with previous research, such as Hwang et al. (2019), which demonstrated that flipped learning positively impacts learner motivation and comprehension in language education. Moreover, the jigsaw strategy’s role in addressing the passivity often observed among learners in East Asian educational settings was noted as a key factor in promoting active participation and self-directed learning.
Jeong (2021) research contributes to the growing body of evidence supporting innovative instructional designs that blend technology with collaborative methods. These findings advocate for integrating flipped learning and jigsaw strategies in teacher education programs to equip future educators with the skills required for effective EFL instruction.
The effectiveness of the jigsaw strategy as a pedagogical approach has been widely recognized in addressing challenges in student participation and language skill development. Jeong (2021) explored the integration of the jigsaw strategy in flipped learning environments to improve the English attitudes and motivation of EFL (English as a Foreign Language) pre-kindergarten teachers. This study emphasized that the jigsaw strategy, which promotes collaborative and interactive learning, effectively engages learners and enhances their participation in discussions. By assigning specific roles and responsibilities within groups, this method ensures equal contribution, thus addressing the common issue of passive participation in group activities. The flipped learning model further complements this approach by encouraging learners to engage with foundational knowledge independently before applying higher-order thinking skills in class.
In addition, Kiuk et al. (2021) supported these findings, highlighting the positive impact of the jigsaw strategy on English-speaking skills and student participation. In their study conducted with junior high school students, the strategy facilitated increased interaction and cooperation among learners. This cooperative learning model, structured around heterogeneous groups, fosters not only academic engagement but also social interaction. Students in Kiuk et al. (2021) study demonstrated a marked

improvement in their ability to discuss, explain, and collaborate effectively, leading to better English-speaking outcomes. The authors recommend the jigsaw strategy as an essential tool for promoting active learning and addressing the diverse needs of students in cooperative learning settings.

The use of the jigsaw strategy is particularly significant in EFL contexts, where learners often exhibit anxiety and reluctance in speaking English due to traditional teacher-centered methods (Jeong, 2021). The strategy's design, which involves expert groups and original groups, promotes a non-threatening environment for learning, enabling students to practice language skills collaboratively. This is consistent with the findings of Hwang et al. (2019), who noted that flipped learning environments incorporating interactive methodologies positively influence learner motivation and comprehension.

Furthermore, both studies underscore the importance of technology in implementing innovative teaching methods. Jeong (2021) utilized tools like Zoom and Learning Management Systems (LMS) to facilitate group discussions and feedback, ensuring continuous engagement in online classrooms. Similarly, Kiuk et al. (2021) highlighted the role of lesson planning and structured group activities in maximizing the effectiveness of the jigsaw strategy.

Jainal and Shahrill (2021) highlight the effectiveness of the Jigsaw strategy in enhancing students' understanding and academic performance in the Marketing for Tourism subject. Their findings show notable improvements in students' test results, as well as increased collaboration and the development of social and interpesonal skills. While Jigsaw method have been shown to foster improved student outcomes in various subjects, it remains unclear whether these benefits extend to critical thinking and teamwork skills.

Tabiolo and Rogayan (2019) conducted a quasi-experimental study to assess the effectiveness of the Jigsaw method in improving the science performance of Grade 9 students in a secondary school in Zambales. The findings revealed that the Jigsaw teaching strategy significantly enhanced students' science achievement, as demonstrated by improved scores in pretests, post-tests, quizzes, laboratory activities, and team assessments. The intervention also fostered active participation during class discussions and various learning tasks, as observed by the teacher. Additionally, the strategy contributed to developing students' sub-skills across four learning dimensions: knowledge, process, understanding, and performance/product.

The study by Elsayed (2022) investigates the effectiveness of the jigsaw strategy compared to traditional lecturing methods in enhancing reading comprehension among Saudi Intensive Course Program (ICP) EFL learners. This experimental research highlights a critical issue in the Saudi EFL education: consistently low performance in English reading comprehension among students, as evidenced by below-average TOEFL scores. Conventional teaching methods that emphasize memorization over interactive engagement have been identified as contributing to these outcomes.

The jigsaw strategy, a cooperative learning method, addresses these limitations by dividing students into small heterogeneous groups, with each member responsible for mastering and teaching a portion of the material to their peers (Johnson et al., 2023). This method promotes collaboration, accountability, and active engagement, essential for developing critical reading skills such as skimming, scanning, and inference-making.

Elsayed (2022) findings revealed statistically significant improvements in the experimental group exposed to jigsaw-based instruction compared to the control group taught through traditional lecturing. Students in the jigsaw group demonstrated higher post-test scores and reported greater motivation and a deeper understanding of the reading material. The study aligns with prior research by Namaziandost et

al. (2020), emphasizing the benefits of cooperative learning in fostering critical thinking and improving academic outcomes in EFL contexts.

Hurst et al. (2013) found that social interaction among students in highly interactive classrooms enhanced comprehension and retention by activating prior knowledge and making new connections. They emphasized that social interaction creates a positive learning environment that encourages collaborative problem-solving and deeper understanding. Their study highlights how learners working together in discussion-based settings construct meaning more effectively than in traditional lecture-based models.

Bacsal et al. (2022) investigated the impact of the jigsaw strategy on elementary pre-service teachers' (EPTs) mathematics achievement and interest in an online learning environment. Their study revealed significant improvements in mathematics achievement following the intervention, with EPTs moving from satisfactory to outstanding performance levels. This aligns with findings from previous research, which highlights the strategy's capacity to enhance performance in challenging subjects like mathematics (Mbacho & Changeiywo, 2013; Russo, 2014). For instance, Okeke (2015) observed that students exposed to the jigsaw strategy outperformed those in traditional settings when learning quadratic equations.

The strategy's efficacy stems from its structure, where students collaboratively solve problems and clarify concepts within expert and home groups. This collaborative dynamic not only promotes academic success but also builds a sense of camaraderie and shared accountability (Garcia et al., 2017). In the online learning landscape, the jigsaw strategy remains effective despite challenges such as internet connectivity and limited teacher supervision. Bacsal et al. (2022) emphasized that the strategy encourages meaningful interactions, even in virtual classrooms, by promoting peer-to-peer learning. Abed et al. (2020) similarly highlighted its ability to improve test scores in mathematics, even under online constraints.

The findings suggest that the jigsaw strategy not only strengthens academic achievement but also prepares future educators to implement cooperative learning methods in their classrooms. By fostering active participation and mutual responsibility, the strategy helps learners internalize concepts more effectively than traditional lecture-based approaches (Oduro et al., 2014).

In conclusion, the jigsaw strategy offers a versatile and effective method for addressing academic and attitudinal challenges in education. While its application in online learning contexts shows promise, further research is needed to address persistent issues like negative attitudes and technical barriers (Oduro et al., 2014).

Herawati et al. (2023) explored the effectiveness of the jigsaw strategy in enhancing students' English-speaking abilities, specifically in expressing gratitude and appreciation. Their research employed an experimental design with 60 students divided into experimental and control groups. The experimental group, taught using the jigsaw strategy, showed a significantly higher mean score improvement (23.03 points) compared to the control group (8.87 points). These findings underscore the potential of the jigsaw method to cultivate speaking proficiency by fostering engagement, collaboration, and mutual support among learners.

The jigsaw strategy is particularly effective in second-language acquisition as it integrates interactive learning with practical language use. Herawati et al. (2023) noted that the strategy allowed students to practice social interactions, such as expressing gratitude, within structured yet dynamic group activities.

This aligns with Brown's (2001) perspective that cooperative learning fosters positive interdependence and promotes a supportive learning atmosphere.

Moreover, the approach was found to improve learners' retention of language skills, as group discussions and collaborative problem-solving require deeper cognitive engagement. Herawati et al. (2023) also observed that students in the experimental group demonstrated increased motivation and enjoyment in learning, which are critical factors in language acquisition.

In conclusion, the jigsaw strategy offers a robust framework for enhancing both language proficiency and collaborative skills. The findings of Herawati et al. (2023) reinforce its efficacy in improving speaking abilities, particularly in expressing gratitude and appreciation, while fostering a positive learning environment. As educational practices continue to evolve, the jigsaw strategy remains a valuable tool for promoting active learning and student-centered instruction.

In a study by Alqersh et al. (2024), the jigsaw strategy significantly improved internship nursing students' health literacy concerning menstrual blood banking. Before the intervention, 93% of students exhibited poor knowledge levels, which improved to 85% demonstrating good knowledge after the intervention. Additionally, a significant positive shift was observed in students' attitudes, with 78% expressing positivity post-intervention compared to only 6% pre-intervention. These findings highlight the strategy's effectiveness in transforming both knowledge and attitudes by fostering collaboration and active participation.

The strategy’s success is attributed to its ability to engage students actively in learning while promoting critical thinking and problem-solving. It encourages peer teaching, where students learn collaboratively and enhance their understanding through group discussions, leading to improved retention and comprehension (Dhull & Verma, 2019). This cooperative environment also boosts self-esteem and cultivates teamwork skills, which are essential in professional fields like nursing (Winslow, 2020).

The efficacy of the jigsaw strategy extends beyond nursing education. Studies have demonstrated its positive influence on various academic disciplines, including literature and computer literacy, by enhancing students' cognitive and attitudinal outcomes (Charernnit et al., 2021; Tekdal & Sonmez, 2018). Such evidence underscores the versatility of the jigsaw method in fostering engagement and improving educational outcomes across diverse fields.

The jigsaw strategy offers a powerful tool for educators aiming to enhance learning outcomes and foster collaborative skills. Alqersh et al.'s (2024) study reaffirms its utility in specialized education contexts, such as nursing, where it significantly improved students’ knowledge and attitudes toward complex topics like menstrual blood banking. As such, the strategy holds promise for broad application in various educational settings, advocating for its integration into standard teaching practices.

Lecture Method. The selection of teaching strategies plays a critical role in shaping the learning experiences of students, particularly in fostering critical thinking and engagement. The debate between the traditional lecture method and discussion teaching method remains pivotal in educational discourse.

The traditional lecture method, characterized by a one-way delivery of content from instructor to learner, has been a cornerstone of educational practices globally. Its efficiency lies in disseminating large amounts of information within a short time frame, making it suitable for large groups and contexts where written material is unavailable (Zlotskaya, 2016). However, this method often lacks interaction and feedback, resulting in passive learning. Studies reveal that the traditional lecture approach minimally contributes to developing critical thinking skills or fostering active engagement among learners (Gholami et al., 2016; Nurutdinova et al., 2016).

Despite its limitations, certain contexts justify the traditional lecture approach. For instance, it is considered effective for delivering factual or foundational knowledge where conceptual understanding or critical analysis is not the primary goal (Zaidi et al., 2017). However, its inability to address diverse learning needs and promote dynamic participation has raised questions about its relevance in modern pedagogy (Gregorius, 2017).

The discussion teaching method, on the other hand, emphasizes active participation, collaboration, and critical reflection. It is a two-way process that fosters interaction between instructors and learners (Dewi, 2019). Research highlights its superiority in developing critical thinking, problem-solving, and cooperative learning skills (Ardeleanu, 2019; Shamsudin et al., 2017). Through small group discussions, learners engage deeply with content, share perspectives, and collaboratively construct knowledge (Keshavarzi et al., 2016).

Numerous studies validate the effectiveness of the discussion method in improving learning outcomes. For instance, Padugupati et al. (2017) found that students exposed to discussion-based strategies demonstrated enhanced problem-solving and comprehension skills compared to those in traditional lecture setups. Similarly, Rosenthal and Walker (2020) concluded that discussion strategies significantly improved learners' critical thinking and academic performance. However, challenges such as time constraints and unequal participation among students persist (Nami et al., 2018).

Comparative analyses reveal that the discussion teaching method is consistently more effective than traditional lectures in fostering meaningful learning. A review of 30 studies by Saira et al. (2021) indicates that 80% of the studies favored the discussion method, citing its ability to actively engage students and enhance critical thinking. By contrast, the traditional lecture was deemed suitable only for scenarios requiring knowledge dissemination without an emphasis on critical analysis.

The research conducted by Tshering G. (2024) in the context of the Royal University of Bhutan provides valuable insights that support the continued exploration and refinement of the lecture method in university education. The study highlights the widespread adoption of lectures as a primary teaching strategy, yet it also reveals a concerning gap in instructors' understanding of the theoretical underpinnings that can enhance the effectiveness of this method. By investigating how educators utilize additional resources and assess their lecture effectiveness, the study underscores the importance of a well-defined delivery model that fosters an optimal learning environment. Furthermore, the expressed desire from both educators and students for improvements in resources and engagement techniques emphasizes the need for a more dynamic approach to the lecture format. These findings advocate for a thoughtful integration of the lecture method, suggesting that with enhanced training and resources, it can be transformed into a more interactive and impactful educational tool, ultimately benefiting student learning outcomes.

While the discussion method aligns with modern pedagogical goals of active learning, it demands significant preparation and facilitation skills from instructors (Chen et al., 2018). Its implementation also requires addressing logistical challenges, such as ensuring balanced participation and managing time effectively. Conversely, traditional lectures, despite their limitations, remain relevant in contexts with large student groups or resource constraints.

The research conducted by Liu et al. (2023) provides valuable insights into the comparative effectiveness of the lecture method and the flipped classroom instruction method (FCIM) on EFL students' academic passion (AP) and responsibility. While the study concludes that FCIM significantly enhances students' AP and responsibility compared to the traditional lecture method, it also highlights

the importance of understanding the limitations of the lecture approach in fostering student engagement and motivation. This finding supports the notion that while the lecture method remains a prevalent instructional strategy, it may require adaptation and enhancement to better activate learners and promote deeper engagement with the material. By identifying the areas where the lecture method falls short, this study underscores the necessity for educators to explore innovative practices that can complement traditional teaching methods, ultimately leading to improved student outcomes. Such insights are crucial for my research, as they emphasize the need for a nuanced understanding of the lecture method's role in contemporary education and the potential for integrating more interactive elements to enhance its effectiveness.

Critical thinking aids in enhancing curiosity, self-awareness, and problem-solving abilities. Research emphasizes its role in fostering creativity, as critical thinkers are inclined to approach problems innovatively and derive unconventional solutions. This creativity is particularly relevant in addressing global challenges such as climate change and pandemics (Jayakumar, 2008; Alsaleh, 2020). Additionally, critical thinking promotes self-reflection and self-discipline, enabling individuals to recognize their biases and improve their decision-making processes (Sharma et al., 2012).

Critical thinking is widely acknowledged as a vital educational goal that enables students to analyze, evaluate, and synthesize information effectively. Defined as the ability to think clearly, reasonably, and independently, critical thinking involves making well-informed decisions and solving problems creatively. This skill allows individuals to identify credible sources, assess the validity of arguments, and draw meaningful conclusions (Raj et al., 2022). In today's fast-paced, data-driven world, critical thinking is essential in education and professional and personal contexts, fostering a sense of autonomy and adaptability in learners (Ennis, 2018).

Self-awareness is another cornerstone of critical thinking. By engaging in reflective practices, students develop a deeper understanding of their thought processes, leading to enhanced confidence and self-assurance. This capacity to self-monitor and learn from mistakes prepares students for complex problem-solving scenarios in both academic and real-world settings (Gupta et al., 2020).

The integration of critical thinking into classroom instruction significantly enhances students' engagement and learning outcomes. A shift from rote memorization to active inquiry allows students to critically evaluate information, challenge assumptions, and develop evidence-based arguments (Loes et al., 2012). This approach aligns with liberal education models that prioritize teaching students how to think rather than what to think, thus nurturing independent learners capable of navigating diverse perspectives and contexts (Raj et al., 2022).

Several pedagogical strategies can be employed to cultivate critical thinking in students. Problem-solving activities, open-ended discussions, and collaborative projects encourage students to question and refine their ideas. Moreover, experiential learning techniques, such as simulations and case studies, provide practical opportunities to apply critical thinking skills in real-world scenarios (Mataniari et al., 2020).

The societal implications of critical thinking are profound. Individuals equipped with critical thinking skills contribute to informed decision-making and constructive dialogue, fostering democratic values and cultural empathy. Furthermore, critical thinking is linked to lifelong learning, as it enables individuals to adapt to evolving challenges and seize opportunities for personal and professional growth (Styers et al., 2018).

In the workplace, critical thinking is a sought-after competency that enhances organizational efficiency and innovation. Employers value employees who can analyze complex data, generate strategic insights, and propose solutions that align with organizational goals. As such, incorporating critical thinking into education is a proactive measure to prepare students for the demands of the modern workforce (Raj et al., 2022).

The integration of critical thinking (CT) into educational settings has gained significant attention as a crucial skill for academic and life success. Critical thinking encompasses both cognitive skills and dispositions, enabling learners to analyze, evaluate, and synthesize information effectively. Studies have shown that fostering CT within classrooms can enhance not only academic performance but also personal and interpersonal development (McPeck, 2016).

In the context of English as a Foreign Language (EFL) instruction, the development of CT skills has been identified as an effective approach to improve learners' reading comprehension and classroom engagement. For instance, Bakhtiari Moghadam et al. (2023) conducted an experimental study in Iran to evaluate the effects of a critical thinking-based intervention program called the 3Es (Exposure, Exploration, Evaluation). This intervention utilized Bloom's Taxonomy (1956, revised in 2001) to scaffold learning through hierarchical cognitive processes, from basic understanding to advanced critical analysis and creation. The findings revealed significant improvements in critical thinking, reading comprehension, and attitudes toward the classroom climate among participants in the experimental group compared to the control group.

The 3Es framework aligns with theories that emphasize active and collaborative learning environments as essential for fostering critical thinking. Research highlights the limitations of lecture-based, teacher-centered approaches in developing CT skills. Instead, interactive strategies like questioning, debates, and evidence-based reasoning are shown to be more effective (Duron et al., 2006; Lin et al., 2016). Furthermore, positive classroom climates, characterized by mutual respect and collaboration, have been linked to better learning outcomes (Barr, 2016; Rahimi & Ebrahimi, 2011).

The integration of CT into EFL curricula also addresses the growing demand for 21st-century competencies. The World Economic Forum (2020) identified CT as one of the top skills needed for the future workforce. This underscores the importance of embedding CT in educational frameworks to prepare students for the complexities of a globalized world.

In conclusion, the incorporation of critical thinking into EFL teaching methodologies has demonstrated significant potential in enhancing learners' cognitive and affective capacities. The findings from Moghadam et al. (2023) and related studies underscore the need for curriculum designers and educators to adopt innovative approaches that integrate CT with language learning objectives.

Teamwork skills are crucial competencies that enhance employability and professional success in modern societies. Defined as the ability to work effectively within a team environment, these skills encompass various sub-competencies such as adaptability, coordination, leadership, and communication (De Prada et al., 2022). Universities have acknowledged their importance, integrating them into curricula to prepare students for dynamic job markets (García, 2016). However, research indicates significant variability in students' mastery of teamwork skills, influenced by socio-academic factors such as gender, academic year, and GPA.

Research consistently highlights that teamwork skills improve as students advance in their academic journey. For instance, final-year students exhibit greater adaptability and decision-making capabilities than their first-year peers (Rodríguez-Gómez et al., 2018). These findings suggest that maturity and

exposure to collaborative academic tasks contribute significantly to the development of these competencies (Burdett & Hastie, 2009). However, the extent of skill improvement varies across contexts and instructional methods, indicating the importance of integrating structured teamwork activities throughout the academic curriculum (Aarnio et al., 2010).

A positive correlation exists between teamwork skills and academic performance, with higher GPA students demonstrating stronger competencies (Lozano-Rodríguez et al., 2020; Park et al., 2015). Interestingly, students with more robust teamwork experience often achieve superior academic results, further emphasizing the link between effective collaboration and educational success (Martínez-Romero et al., 2021). Despite this, some studies report cultural variations, suggesting that the perception of teamwork's impact on grades influences student attitudes and outcomes (Chapman & Van Auken, 2001). Addressing these discrepancies through specific training can foster both academic excellence and employability.

The integration of teamwork training in higher education is vital for addressing gaps in skill acquisition and ensuring alignment with industry demands. Universities must adopt innovative pedagogical approaches, such as project-based learning and experiential activities, to enhance student engagement and competence (Fidalgo-Blanco et al., 2019). Moreover, extracurricular initiatives, including sports, volunteering, and arts, have demonstrated efficacy in cultivating teamwork abilities (De Prada et al., 2022). By fostering these skills early in academic programs, institutions can better prepare students for successful transitions to professional environments.

Teamwork skills have gained increasing recognition as essential competencies in higher education, preparing students for academic, professional, and personal success. These skills encompass various elements such as adaptability, coordination, leadership, decision-making, communication, and interpersonal relationships (De Prada et al., 2024).

Incorporating teamwork training into university curricula has shown to enhance both technical and emotional skills, providing students with a comprehensive foundation for future success. As teamwork skills are multidimensional, their mastery contributes significantly to creating a supportive and inclusive academic environment (De Prada et al., 2024).

A positive relationship exists between teamwork skills and self-esteem. Studies have demonstrated that effective communication, leadership, and decision-making within a team environment significantly enhance individuals' self-confidence and self-worth (Toader et al., 2021). The psychological benefits of teamwork stem from fostering collaboration, trust, and a sense of belonging among team members, which positively impacts self-esteem (Simsek, 2013).

Moreover, teamwork provides opportunities for students to develop interpersonal relationships and manage conflicts constructively, which are crucial for emotional well-being. Leadership has emerged as a critical component of teamwork, with research emphasizing its role in empowering individuals and fostering a positive self-image (Báez-Rosario, 2017).

The integration of teamwork skills in academic settings aligns with the broader goals of employability and lifelong learning. By engaging in team-based activities, students develop critical decision-making and problem-solving abilities, which are directly transferable to professional environments (Marshall et al., 2005). Furthermore, teamwork training encourages adaptability and coordination, enabling students to navigate diverse and dynamic work scenarios effectively.

The research conducted by De Prada et al. (2022) provides valuable insights into the mastery of teamwork skills among higher education students and the influence of socio-academic variables such as

gender, academic year, and grade point average (GPA). By analyzing a sample of 615 social science degree students, the study reveals significant gender differences in teamwork skills, with female students generally outperforming their male counterparts, particularly in areas other than leadership. Additionally, the findings indicate that students' teamwork skills improve as they advance in their studies, especially in adaptability and decision-making. The positive correlation between teamwork skills and GPA further emphasizes the importance of academic performance in skill acquisition. This research highlights the need for universities to consider these socio-academic factors when designing educational programs, suggesting that tailored interventions could enhance teamwork skills across diverse student populations. Such insights are crucial for my research, as they underscore the multifaceted nature of teamwork skill development and the necessity for educational strategies that promote equity and leverage the strengths of different student groups.

While teamwork is widely recognized for its benefits, challenges remain in its implementation. Factors such as group composition, individual differences, and task complexity can influence team performance and individual outcomes. Research highlights that carefully designed teamwork activities, supported by structured training and feedback mechanisms, can address these challenges and optimize the benefits of collaboration (Eliasa, 2014).

The role of educators in fostering teamwork cannot be overstated. Providing constructive feedback and recognizing students' contributions are key strategies for enhancing teamwork skills and, consequently, self-esteem. Institutions must prioritize teamwork training in their pedagogical frameworks, ensuring that students acquire not only technical knowledge but also the social and emotional competencies necessary for success.

Theoretical Framework

This study was anchored on the theory of Social Constructivism (1968) propounded by Russian and Soviet Psychologist Lev Vygotsky, that emphasizes the collaborative nature of much learning. This theory view that learning occurs through social interaction and the help of others, often in a group. According to the theory, social interaction shapes an individual's understanding. Vygotsky had a belief that the community played an essential role in the making of meaning. According to him, the community and, by extension, the learners' environment contributes heavily to how and what they think about. This implies that all teaching and learning are products of a socially constitutive process of sharing information. This theory lies on a number of beliefs or guiding principles, including the following: people construct knowledge through their actions, society's members work together to create reality, learning is an active and social process, people interact with one another and their surroundings to create meaning, and meaningful learning happens when people participate in social activities.

By encouraging critical thinking and teamwork through collaborative learning, where students actively construct information by engaging with peers, the Jigsaw method in this study is in line with social constructivism. This method encourages critical thinking as students evaluate, synthesize, and explain difficult ideas. Each student is accountable for learning a portion of the subject and teaching it to others. Based on the ideas of social constructivism, this peer-to-peer interaction helps students to depend on one another's knowledge, enhancing their cooperation abilities by developing their interdependence, accountability, and communication skills in the process of accomplishing shared learning objectives.

In this study, the independent variables are the teaching methods employed: the Jigsaw strategy (experimental group) and the Lecture Discussion method (control group), while the dependent variables

are students' critical thinking and teamwork skills. The Jigsaw strategy, rooted in Social Constructivism, promotes critical thinking by requiring students to engage deeply with the material, analyze it, and communicate their understanding to peers. This active engagement enhances individual critical thinking and fosters teamwork as students collaborate to achieve common goals, relying on one another's strengths. In contrast, the Lecture Discussion method, while informative, often emphasizes individual learning and assessment, limiting opportunities for developing critical thinking and teamwork skills. By comparing these two teaching methods, this study aims to clarify the relationship between collaborative learning and the development of critical thinking and teamwork skills.

Statement of the Problem

The study aimed to analyze the effects of Jigsaw method on students critical thinking and teamwork skills. This was guided by the following questions.

1. What is the pretest scores of the students on their critical thinking skills?
2. What is the posttest scores of the students on their critical thinking skills?
3. What is the Peer rating result of the students before and after using Jigsaw strategy?
4. .What is the Peer Rating result of the students before and after using the Lecture Method?
5. What is the Observation rating of the students using Jigsaw strategy and Lecture Method?
6. Is there significant difference between the pretest and posttest scores of the students using Jigsaw Strategy?
7. Is there significant difference between the pretest and posttest scores of the students using Lecture Method?
8. Is there a significant difference between the Peer rating result of the students before and after the use of Jigsaw Strategy?
9. Is there a significant difference between the peer rating result of the students before and after the use of Lecture Method?
10. Is there significant difference between the observation rating result of the students using Jigsaw strategy and Lecture method?

Null Hypothesis

H_{01}. There is no significant difference between the pretest and posttest scores of the students using Jigsaw Strategy.

H_{02}. There is no significant difference between the pretest and posttest scores of the students using Lecture Method.

H_{03}. There is no significant difference between the peer rating result of the students before and after the use of Jigsaw Strategy.

H_{04}. There is no significant difference between the peer rating result of the students before and after the use of Lecture Method.

H_{05}. There is no significant difference between the observation rating result of the students using Jigsaw strategy and Lecture Method.

Scope and Delimitation of the Study

This study aimed to examine the impact of the Jigsaw strategy on enhancing students' critical thinking and teamwork skills. By using this cooperative learning method, where students learned specific

material segments and taught their peers, the research explored its effect on critical thinking and teamwork abilities. Specifically, it assessed whether the Jigsaw method improved critical thinking and teamwork compared to traditional lecture methods.

The study took place at Monkayo College of Arts, Sciences and Technology in Monkayo, Davao de Oro, Philippines, during the second semester of Academic Year 2024-2025. The research lasted for two months, with two matched sections assigned randomly to experimental (Jigsaw strategy) and control (lecture method) groups. The focus was on pre-test and post-test scores measuring critical thinking, as well as peer ratings and teachers' observation measuring teamwork skills before and after using the Jigsaw method and Lecture Method.

Significance of the Study

This study aimed to investigate the effects of the Jigsaw strategy on enhancing critical thinking and teamwork skills among college students.

Learners. The results of the study provided valuable insights into how the Jigsaw strategy helped students develop essential skills like critical thinking and teamwork. These competencies were not only crucial for academic success but were also highly valued in the workplace. By participating in this strategy, students gained practical experience in collaborative learning, problem-solving, and active engagement, which enhanced both their individual and group performance.

Teachers. The result of the study offered evidence on the effectiveness of the Jigsaw strategy as a teaching method. With a better understanding of its impact on critical thinking and teamwork, instructors could incorporate this approach into their teaching practices to enhance student engagement and learning outcomes, thereby enriching their pedagogical techniques.

School Administrators. The result of the study offered school administrators as it provided insights into innovative teaching strategies that could improve academic performance and student development. By implementing evidence-based strategies like Jigsaw, administrators were able to foster an environment that valued collaboration and critical thinking, making the institution more competitive and attractive to prospective students and faculty.

Future Researchers. The result of the study added to the existing body of knowledge on cooperative learning strategies and their effects on student outcomes. Future researchers could use this study as a reference to build upon, exploring further dimensions or adapting the strategy to different student populations, educational settings, or skill areas.

By demonstrating the Jigsaw strategy's impact on critical thinking and teamwork, this study contributed to more effective teaching and learning practices that benefitted students and the broader educational community.

METHODS

Research Design

This study employed a quasi-experimental design to examine the impact of the Jigsaw strategy on enhancing students' critical thinking and teamwork skills. Quasi-experiments were valuable when randomization was not feasible, allowing for meaningful comparisons between groups despite potential internal validity challenges, such as selection bias (Maciejewski, 2020). The study involved two groups: an experimental group using the Jigsaw strategy and a control group utilizing lecture methods. Both groups underwent pre-tests and post-tests to measure changes in critical thinking, along with peer ratings

and observation sheets for teamwork skills, facilitating a direct comparison of outcomes before and after the intervention. To address potential threats to internal validity, the study defined treatment and comparator cohorts clearly, established inclusion/exclusion criteria, and employed rigorous statistical analysis.

Quasi-experimental designs provided valuable insights into causal relationships, especially when randomization was impractical, ethical, or feasible, such as in field settings or large groups. When certain assumptions were met like careful selection of comparison groups and appropriate control for confounding variables quasi-experimental designs yielded strong internal validity and credible estimates of an intervention's causal impact (Cham, 2022). By leveraging natural or pre-existing groupings, such as classroom settings, quasi-experiments served as a pragmatic alternative to randomized controlled trials (RCTs), making them a powerful tool for applied research in real-world contexts.

Research Locale

This study was conducted at the Monkayo College of Arts, Sciences, and Technology (MonCAST), located on L.S. Sarmiento Street, Poblacion, in the Municipality of Monkayo, Davao de Oro. As the first LGU-run local college in the province, MonCAST plays a vital role in delivering tertiary education in the region. Established through Municipal Ordinance No. 21 in 2008 and officially recognized by CHED in 2009, the institution offers a range of programs, including the Bachelor of Elementary Education-Generalist, which is the specific focus of this study. Situated in a gold-rich province and municipality known for its mining history and economic growth, MonCAST serves 5,402 students across various academic disciplines. Its central location—just meters from major local landmarks such as the Municipal Hall and Monkayo Central Elementary School—makes it an accessible and strategic site for investigating the integration of AI tools in language instruction within teacher education programs.

Research Subjects

The subjects of this study were 109 first-year BEEd students who were enrolled at Monkayo College of Arts, Sciences, and Technology during the second semester of the academic year 2024-2025. Three sections were initially considered, and two sections were selected based on matched sampling to ensure comparable characteristics. One section, BEEd 1A, was assigned as the control group, and the other, BEEd 1B, served as the experimental group. A total of 54 students from BEEd 1A were designated as the control group, and 55 students from BEEd 1B were assigned to the experimental group. This selection process ensured a balanced comparison of the two groups in terms of relevant variables for the study.

Research Instruments

The researcher used a teacher-made pretest/posttest to gather reliable and valid data. The pretest was used to determine both groups' critical thinking levels before using the jigsaw strategy and lecture method. The posttest was used to identify any progress or differences in both experimental and control groups' critical thinking skills by comparing their scores on the posttest and pretest. The pretest/posttest comprised 40 items based on the topics covered for the final examination for BEEd first-year students in their subject, General Education 10: Entrepreneurial Mind.

A Table of Specifications (TOS) was also prepared to distribute the test items across different comprehension skills. The questionnaire was a multiple-choice test with four choices for each item. The test comprised 30% lower-order and 70% higher-order thinking skills.

The researcher also used the adaptive peer and observation rating sheets at Monkayo College of Arts, Sciences, and Technology. The peer rating and observation rating sheets were used to determine the level of teamwork skills before and after the application of the jigsaw strategy and lecture method.

Validation of Research Instrument

Panels of external and internal validators were assigned to check the instrument before it was administered to the respondents. To test the validity of the instrument, 20 students who were not involved in the study were asked to answer the instrument to determine if the questions would indeed measure what was intented. Should any problems arise, the researcher would investigated them and made revisions to the instrument.

Additionally, a pretest-posttest design was utilized, accompanied by a Table of Specification (TOS) to ensure the proper distribution of test items across various content areas. The item analysis, reliability test, and validity test were conducted using appropriate statistical formulas to confirm the instrument's effectiveness and consistency. This rigorous validation process aimed to enhance the reliability of the findings and ensure that the instrument accurately captured the desired outcomes.

Data Collection Procedure

The study adopted a quasi-experimental design, utilizing pre and post-assessment to measure changes in critical thinking and teamwork skills. Two groups were selected: an experimental group that participated in the Jigsaw method and a control group that received traditional instruction. The following were the data procedures that were employed in this study.

Seeking Ethical Clearance. The data collection process began with the researcher sought ethical clearance from the Research Office to ensure adherence to ethical standards. Once clearance was granted, an endorsement was obtained from the Graduate School and was submitted to the school president to request permission to conduct the study. After receiving the necessary approvals, the researcher coordinated with the selected respondents and carried out the data-gathering procedures, which included administering pretests and posttests, as well as conducting peer and observation ratings.

Gathering Test Material. The researcher taught GenEd 10: Entrepreneurial Mind. Anchored on this, is the teacher's syllabus which served as a guide in delivering lessons on every session. A pretest and posttest used is the instrument.

Seeking Permission to Conduct the Study. The researcher wrote a letter of request and permission to the College President of the Monkayo College of Arts, Sciences and Technology through their Research Office prior to conducting the study and to sign a consent form. Furthermore, the researcher observed proper ethical standards in the conduct of the study; the names of the subjects were not indicated and any important matters were kept with utmost confidentiality. The researcher then proceeded to conduct the study.

Administration of the Instrument. Since the pretest, the researcher gathered data on the students' level in critical thinking and teamwork skills. The researcher then prepared lessons, which were employed during the implementation of the Jigsaw strategy for the experimental group and traditional instruction

for the control group. After the administration of lessons over 10 sessions, each lasting 1 hour and 30 minutes, a post-test was conducted using the same instrument as the pretest.

The experimental group engaged in Jigsaw strategy learning activities, where students were divided into "home" groups, and each member became an expert on one segment of the lesson. After learning their segment, they met in "expert" groups to share knowledge, then returned to their home groups to teach their peers.

The control group received conventional teaching methods, including lectures and group discussions without the use of the Jigsaw approach.

Statistical Treatment

To analyze the effects of the Jigsaw method on student critical thinking and teamwork skills, the researcher used SPSS statistical tool in analyzing the data. Thus, the following statistical procedures were used:

Descriptive Statistics- Mean, standard deviation, and level of competency were used to describe and summarize the students' critical thinking and teamwork skills in both control and experimental groups. This includes the analysis of pretest and post-test scores, as well as peer and observation ratings before and after the intervention.

Paired Sample T-test- In this study, the Paired Sample T-Test was utilized to analyze the changes in students' critical thinking and teamwork skills by comparing pretest and posttest scores, as well as peer ratings before and after the implementation of both the Jigsaw strategy and the Lecture method. This statistical test is particularly effective for assessing the impact of an intervention on the same group of subjects measured at two different points in time.

Independent T-Test- In this study, the Independent T-Test was specifically employed to compare the observation ratings of students' teamwork skills between the experimental group (Jigsaw strategy) and the control group (Lecture method). This statistical test is particularly useful for assessing whether there are significant differences in the means of two independent groups, which in this case are the students who participated in different teaching methods.

Ethical Considerations

Before the researcher conducted the study, it was the researcher's responsibility to respect the rights, needs, values and desires of the respondents. The researcher took necessary measures to strictly adhere to the ethical guidelines to safeguard the participants' privacy, confidentiality, dignity, rights, and anonymity. Thus, the following considerations were carefully observed by the researcher in gathering the data.

Social Value. This research study was conducted to analyze the effects of Jigsaw strategy on students critical thinking skills and teamwork skills at Monkayo College of Arts, Sciences and Technology. The study also determined if the two independent variables have significant relationship to the effects of the Jigsaw strategy. This study was expected to be beneficial to the institution in strengthening and improving the pedagogies in teaching.

Informed Consent. The researcher provided an Informed Consent Form to the respondents of the study and ensured that they understood the purpose and the process of conducting the study. The researcher discussed their rights and the importance of their participation in the study. However, if they decided to

withdraw from the study, the researcher fully accepted their decisions, ensuring that their participation was entirely voluntary.

Vulnerability of the Research Participants. The researcher ensured that the participation of the respondents in the study was in their best interest and of their own free will. They were not coerced by their teacher, especially those students who participated in the study.

Risks, Benefits, and Safety. As part of the Informed Consent process, the researcher discussed with the respondents the possible risks and benefits of participating in the study. The researcher ensured the respondents safety, particularly regarding the proper storage of their information.

Privacy and Confidentiality of Information. The researcher ensured that the participant's personal information, identity, and data gathered were kept confidential and secure, in compliance with the Data Privacy Act of 2012. The test instruments were kept in a secure box, and the tallied and gathered data were stored in a password-protected Google drive. The stored test papers and data were scheduled to be destroyed after three years of storage.

Justice. The research respondents were chosen based on the results of their pretest. Th :archer believed that they could provide the necessary data to achieve the purpose of the study.

Results

Pretest Scores of Students on Critical Thinking Skills

This section presents the results to the first statement of the problem that examines the critical thinking skills of students' according to their pretest scores.

Pretest Scores of Students on Critical Thinking Skills of the Control and Experimental Group. Table 1 shows the Mean Comparison of Pretest Scores of Control and Experimental Groups, providing a visual representation of the outcomes.

Table 1
Mean Comparison of Pretest Scores of Control and Experimental Group

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
pre test (control)	54	9.00	34.00	23.1852	5.66377
pre test (experimental)	55	10.00	32.00	23.2182	4.72068
Valid N (listwise)	54				

The pretest scores for students' critical thinking skills were analyzed for both the control and experimental groups, revealing several key findings. The control group, consisting of 54 students, had a minimum score of 9.00 and a maximum score of 34.00, with a mean score of 23.1852 and a standard deviation of 5.66377. In comparison, the experimental group, which included 55 students, had scores ranging from 10.00 to 32.00, resulting in a mean score of 23.2182 and a lower standard deviation of 4.72068.

The mean scores indicate that both groups possess similar levels of critical thinking skills at the outset of the study. However, the control group exhibited a wider range of scores, suggesting greater variability in critical thinking skills among its members, while the experimental group demonstrated more consistent

performance. The higher standard deviation in the control group further emphasizes this variability, indicating that its scores are more spread out from the mean compared to the experimental group.
Overall, the pretest results highlight comparable mean scores in critical thinking skills for both groups, with notable differences in score distribution and variability. These insights will be essential for analyzing the impact of the Jigsaw method on enhancing critical thinking skills in subsequent assessments.

Posttest Scores of Students on Critical Thinking Skills
This section presents the results to the second statement of the problem that examines the critical thinking skills of students' according to their posttest scores.

Posttest Scores of Students on Critical Thinking Skills of the Control and Experimental Group.
Table 2 shows the Mean Comparison of Posttest Scores of Control and Experimental Group, providing a visual representation of the outcomes.

Table 2
Mean Comparison of Posttest Scores of Control and Experimental Group

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
post test (control)	54	9.00	35.00	25.2593	4.98369
post test (experimental)	55	15.00	35.00	26.0909	5.58527
Valid N (listwise)	54				

In terms of the results related to the second statement of the problem, which examines the critical thinking skills of students based on their posttest scores. The analysis focuses on the mean comparison of posttest scores between the control and experimental groups. The results indicate that the Jigsaw strategy had a positive impact on students' critical thinking skills, as evidenced by the higher mean score in the experimental group (26.0909) compared to the control group (25.2593). This suggests that students in the experimental group, who were taught using the Jigsaw strategy, performed better on the posttest compared to those in the control group.
Additionally, the experimental group had a higher minimum score (15.00) compared to the control group (9.00), indicating that even the lowest-performing students in the experimental group had a better grasp of critical thinking skills. The standard deviation for the experimental group (5.58527) was also higher than that of the control group (4.98369), suggesting a wider variability in critical thinking skills among students who experienced the Jigsaw method. Overall, these results underscore the effectiveness of the Jigsaw strategy in enhancing critical thinking abilities among students, providing a more consistent learning experience and improving overall performance.

Peer rating result on Students' teamwork skills before and after using the Jigsaw Strategy
This section presents the results of the third statement of the problem, which examines the teamwork skills of students according to their Peer Ratings before and after using the Jigsaw strategy.

Table 3
Peer Ratings before and after the Jigsaw Strategy of the Experimental Group

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Before- Peer Rating (Experimenta)l	55	77.00	98.60	88.40	5.38409
After- Peer Rating (Experimental)	55	82.75	100.00	94.68	4.08904

The results presented in Table 3 provide a comprehensive overview of the peer ratings regarding students' teamwork skills before and after the implementation of the Jigsaw strategy within the experimental group. The data indicates that prior to the intervention, the mean peer rating for teamwork skills was 88.40, with scores ranging from a minimum of 77.00 to a maximum of 98.60. This initial rating reflects a solid foundation of teamwork skills among the students, suggesting that they were already functioning effectively in collaborative settings.

Following the implementation of the Jigsaw strategy, the mean peer rating increased significantly to 94.68, with scores ranging from 82.75 to 100.00. This improvement of 6.28 points in the mean score indicates a notable enhancement in students' perceived teamwork skills after engaging in the Jigsaw activities. The reduction in standard deviation from 5.38409 to 4.08904 also suggests that the ratings became more consistent among peers, indicating a more uniform perception of teamwork skills across the group. This consistency may reflect the positive impact of the Jigsaw strategy in fostering collaboration and communication among students, as they worked together to learn and teach different segments of the material.

In conclusion, the peer rating results demonstrate that the Jigsaw strategy effectively enhanced students' teamwork skills, as evidenced by the significant increase in mean scores and the improved consistency of ratings. The findings underscore the value of cooperative learning methods in promoting not only academic achievement but also essential interpersonal skills. As students engaged in the Jigsaw strategy, they likely developed greater collaboration, communication, and mutual support, which are critical components of effective teamwork. These results highlight the importance of integrating innovative teaching strategies that foster teamwork skills in educational settings, preparing students for collaborative environments in their future academic and professional endeavors

Peer rating result on Students' teamwork skills before and after using the Lecture Method

This section presents the results of the fourth statement of the problem, which examines the teamwork skills of students according to their Peer Ratings before and after using the Lecture Method.

Table 4
Peer Ratings before and after Lecture Method of the Control Group

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Before- Peer Rating Control Group	54	75.75	100.00	92.930	5.86622

After- Peer Rating Control Group	54	75.75	100.00	93.8917	5.82683

The results presented for the control group, which utilized the Lecture method, provide important insights into the impact of this traditional teaching approach on students' teamwork skills as assessed through peer ratings. In the pre-intervention phase, the control group, consisting of 54 students, achieved a mean peer rating of 92.93, with scores ranging from a minimum of 75.75 to a maximum of 100.00. This high mean score indicates that students already exhibited strong teamwork skills prior to the intervention, suggesting that the Lecture method may have been effective in fostering a collaborative environment, even before the implementation of any specific strategies aimed at enhancing teamwork.

Following the intervention, the mean peer rating for the control group increased slightly to 93.89, with the same range of scores from 75.75 to 100.00. This increase of 0.96 points in the mean score indicates a modest improvement in students' perceived teamwork skills after the Lecture method was employed. The standard deviation also shows a slight decrease from 5.86622 to 5.82683, suggesting that the ratings became marginally more consistent among peers. While the improvement is positive, it is relatively small compared to the changes observed in the experimental group that utilized the Jigsaw strategy, indicating that the Lecture method may not have had as significant an impact on enhancing teamwork skills.

In conclusion, the peer rating results for the control group suggest that while the Lecture method maintained a high level of perceived teamwork skills among students, the improvement observed was minimal. The findings indicate that traditional teaching methods may provide a solid foundation for teamwork skills. Still, they may not be as effective as more interactive and collaborative approaches, such as the Jigsaw strategy, in fostering significant growth in these skills. Overall, the results highlight the importance of exploring diverse teaching methodologies to enhance student teamwork and collaboration, as these skills are essential for success in both academic and professional settings.

Observation rating result on Students' teamwork skills using Jigsaw Strategy and Lecture Method

This section presents the results to the fifth statement of the problem that examines the teamwork skills of the students according to their Observation ratings using Jigsaw strategy and Lecture method.

Table 5

Observation Rating of Students' using Jigsaw Strategy and Lecture Method

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Observation Rating-(Experimental)	54	86.00	100.00	94.7273	3.57696
Observation Rating- (Control)	54	80.00	90.00	86.0556	3.13481

The observation rating results provide a comparative analysis of students' teamwork skills as assessed through direct observation in both the experimental group, which utilized the Jigsaw strategy, and the control group, which employed the Lecture method. In the experimental group, consisting of 54

students, the mean observation rating was 94.73, with scores ranging from a minimum of 86.00 to a maximum of 100.00. This high mean score indicates that students demonstrated strong teamwork skills while engaging in the Jigsaw activities, reflecting the effectiveness of this collaborative learning approach in fostering cooperation, communication, and mutual support among peers.

In contrast, the control group, also comprising 54 students, achieved a mean observation rating of 86.06, with scores ranging from 80.00 to 90.00. While this score is respectable, it is significantly lower than that of the experimental group. The standard deviation for the control group was 3.13481, indicating a relatively consistent perception of teamwork skills among peers, but the overall mean suggests that the Lecture method may not have facilitated the same level of engagement and collaboration as the Jigsaw strategy. The difference in mean scores (8.67 points) highlights the potential advantages of interactive teaching methods in enhancing students' teamwork abilities.

In conclusion, the observation rating results underscore the effectiveness of the Jigsaw strategy in promoting teamwork skills compared to the traditional Lecture method. The significantly higher mean score for the experimental group suggests that students were more engaged and collaborative when working together in the Jigsaw format, which likely contributed to their enhanced teamwork skills. These findings emphasize the importance of incorporating active learning strategies in educational settings to foster essential interpersonal skills, preparing students for collaborative environments in their future academic and professional endeavors. Overall, the results advocate for the continued exploration and implementation of innovative teaching methods that prioritize student interaction and cooperation.

Difference between the pretest and posttest scores of the students using Jigsaw Strategy

This section presents the results to the sixth statement of the problem that examine the difference between the pretest and posttest of the students using Jigsaw strategy.

Table 6

Pre-test and Posttest of the Jigsaw Strategy of the Experimental group

Test	Mean	SD	t-value	p-value	Remark	Interpretation
Pretest	23.22	4.72	4.460	0.000	Reject Ho	significant
Posttest	26.10	5.59				

The results presented in the table indicate a significant difference between the pretest and posttest scores of students who participated in the Jigsaw strategy. The pretest mean score was 23.22, with a standard deviation (SD) of 4.72, while the posttest mean score increased to 26.10, with a standard deviation of 5.59. The calculated t-value of 4.460, along with a p-value of 0.000, suggests that the difference in scores is statistically significant. Since the p-value is less than the conventional threshold of 0.05, we reject the null hypothesis (Ho), which posits that there is no difference between the pretest and posttest scores.

The increase in mean scores from the pretest to the posttest indicates that students demonstrated a notable improvement in their critical thinking skills after engaging in the Jigsaw strategy. This enhancement can be attributed to the collaborative nature of the Jigsaw method, which encourages students to actively participate in their learning by teaching and learning from their peers. The significant t-value further supports the conclusion that the Jigsaw strategy effectively facilitated the development of critical thinking skills among students, leading to measurable gains in their performance.

In conclusion, the results highlight the positive impact of the Jigsaw strategy on students' critical thinking skills, as evidenced by the significant increase in posttest scores. The findings suggest that implementing cooperative learning strategies, such as the Jigsaw method, can lead to substantial improvements in students' academic abilities. This underscores the importance of adopting innovative teaching approaches that promote active engagement and collaboration, ultimately enhancing students' learning outcomes and preparing them for future academic and professional challenges.

Difference between the pretest and posttest scores of the students using Lecture Method

This section presents the results to the seventh statement of the problem that examine the difference between the pretest and posttest of the students using Lecture Method.

Table 7
Pretest and Posttest of the Lecture Method of the Control Group

Test	Mean	SD	t-value	p-value	Remark	Interpretation
Pretest	23.19	5.66	3.44	0.001	Reject Ho	significant
Posttest	25.26	4.98				

The results presented in the table indicate a significant difference between the pretest and posttest scores of students who participated in the Lecture method. The pretest mean score was 23.19, with a standard deviation (SD) of 5.66, while the posttest mean score increased to 25.26, with a standard deviation of 4.98. The calculated t-value of 3.44, along with a p-value of 0.001, suggests that the difference in scores is statistically significant. Since the p-value is less than the conventional threshold of 0.05, we reject the null hypothesis (Ho), which posits that there is no difference between the pretest and posttest scores.

The increase in mean scores from the pretest to the posttest indicates that students demonstrated an improvement in their critical thinking skills after being taught using the Lecture method. This enhancement, while significant, is less pronounced than the improvements observed in the experimental group using the Jigsaw strategy. The results suggest that the Lecture method can still facilitate some level of growth in critical thinking skills, but the extent of improvement may not be as substantial as that achieved through more interactive and collaborative teaching approaches.

In conclusion, the findings highlight that the Lecture method has a positive impact on students' critical thinking skills, as evidenced by the significant increase in posttest scores. However, the magnitude of improvement is relatively modest compared to the gains observed with the Jigsaw strategy. This underscores the importance of exploring and integrating diverse teaching methodologies that promote active engagement and collaboration among students, as these approaches may lead to more substantial enhancements in critical thinking and other essential skills. Overall, while the Lecture method is effective, the results advocate for the continued use of innovative strategies that foster deeper learning and student interaction.

Significant difference between the Peer rating result of the students before and after the use of Jigsaw Strategy

This section presents the results to the eighth statement of the problem that examine the difference between the Peer rating of the students before and after the use of Jigsaw strategy.

Table 8
Peer Rating Result of the students' before and after Jigsaw Strategy

Peer Rating	Mean	SD	t-value	p-value	Remark	Interpretation
Before	88.40	5.38	14.79	0.000	Reject Ho	Significant
After	94.68	4.09				

The results indicate a significant improvement in peer ratings among students who participated in the Jigsaw strategy, highlighting the effectiveness of this collaborative learning approach. Prior to the implementation of the Jigsaw method, the mean peer rating was 88.40, with a standard deviation (SD) of 5.38. After engaging in the Jigsaw activities, the mean peer rating increased to 94.68, accompanied by a reduced standard deviation of 4.09. This substantial change suggests that students not only recognized the value of their peers' contributions but also experienced enhanced collaboration and engagement in their learning environment.

The statistical analysis further supports the significance of these findings, with a calculated t-value of 14.79 and a p-value of 0.000. Since the p-value is well below the conventional threshold of 0.05, we reject the null hypothesis (Ho), which posits that there is no difference in peer ratings before and after the Jigsaw strategy. The increase in mean peer ratings indicates that students perceived their peers' teamwork and collaboration more positively after the Jigsaw method was implemented. This improvement can be attributed to the interactive nature of the Jigsaw strategy, which encourages students to work together, share knowledge, and support one another in their learning processes.

In conclusion, the findings demonstrate that the Jigsaw strategy significantly enhances peer ratings, reflecting improved collaboration and engagement among students. This underscores the importance of incorporating interactive teaching methods in educational settings to foster a more supportive and effective learning environment. The results advocate for the continued use of the Jigsaw strategy as a means to enhance peer interactions and overall student performance, ultimately preparing students for collaborative environments in their future academic and professional endeavors.

Significant difference between the peer rating result of the students before and after the use of Lecture Method.

This section presents the results to the ninth statement of the problem that examine the difference between the Peer rating of the students before and after the use of Lecture Method.

Table 9
Peer Rating Result of the students' before and after Lecture Method

Peer Rating	Mean	SD	t-value	p-value	Remark	Interpretation
Before	92.91	5.87	2.25	0.029	Reject Ho	Significant
After	93.89	5.83				

The results indicate a significant improvement in peer ratings among students who participated in the Lecture Method. Prior to the implementation of this teaching approach, the mean peer rating was 92.91, with a standard deviation (SD) of 5.87. After the Lecture Method was applied, the mean peer rating

increased to 93.89, accompanied by a slightly lower standard deviation of 5.83. This increase suggests that students began to perceive their peers' contributions more positively after the lectures, indicating a potential enhancement in collaboration and engagement within the classroom.

The statistical analysis further supports the significance of these findings, with a t-value of 2.25 and a p-value of 0.029. Since the p-value is below the conventional threshold of 0.05, we reject the null hypothesis (Ho), which posits that there is no difference in peer ratings before and after the Lecture Method. The significant increase in peer ratings suggests that the structured nature of the lectures may have provided students with clearer expectations and a better understanding of the material, leading to more constructive assessments of their peers' contributions.

In conclusion, the findings demonstrate that the Lecture Method has a positive impact on peer ratings, reflecting improved perceptions of collaboration and engagement among students. While the increase in ratings is modest, it highlights the potential benefits of traditional teaching methods in fostering a supportive learning environment. These results suggest that incorporating lectures into educational practices can enhance peer interactions and overall student performance, ultimately contributing to a more effective learning experience.

Significant difference between the observation rating result of the students using Jigsaw strategy and Lecture Method.

This section presents the results to the tenth statement of the problem that examine the difference between the Observation rating result of the students using Jigsaw strategy and Lecture Method.

Table 10
Independent T-test

Test	Mean	SD	T-value	Interpretation
BEED 1A (Control)	86.06	3.13	13.47	Significant
BEED 1B (Experimental)	94.73	3.58		

The results indicate a significant difference in observation ratings between students who participated in the Jigsaw strategy (experimental group) and those who were taught using the Lecture Method (control group). The mean observation rating for the control group (BEED 1A) was 86.06, with a standard deviation (SD) of 3.13, while the experimental group (BEED 1B) achieved a mean rating of 94.73, with a standard deviation of 3.58. This substantial difference in mean scores suggests that students in the Jigsaw group exhibited significantly higher levels of engagement, collaboration, and critical thinking skills during the learning process.

The statistical analysis further supports the significance of these findings, with a t-value of 13.47 and a p-value of 0.000. Since the p-value is well below the conventional threshold of 0.05, we can confidently reject the null hypothesis (Ho), which posits that there is no difference in observation ratings between the two teaching methods. The significant increase in observation ratings for the Jigsaw strategy indicates that this cooperative learning approach effectively fosters a more interactive and supportive learning environment, allowing students to engage more deeply with the material and with each other.

In conclusion, the findings highlight the effectiveness of the Jigsaw strategy in enhancing students' observation ratings compared to the traditional Lecture Method. The higher mean score for the

experimental group reflects improved teamwork, critical thinking, and overall engagement among students. This underscores the importance of incorporating innovative teaching methods, such as the Jigsaw strategy, into educational practices to promote active learning and better prepare students for collaborative environments in their academic and professional futures. The results advocate for a shift away from traditional lecture-based approaches towards more interactive and student-centered learning experiences.

Chapter IV
Discussions and Conclusion

This chapter discusses the findings of the study, focusing on the effects of the Jigsaw method on students' critical thinking and teamwork skills.

Discussions

Pretest Scores of Students on Critical Thinking Skills. The analysis of pretest scores revealed that the control and experimental groups had comparable baseline critical thinking skills. This similarity in starting points validates the initial equivalence of groups and allows for a fair comparison of the interventions' effects on critical thinking development. Such comparable baseline findings echo the importance of ensuring matched groups in quasi-experimental studies as outlined by Maciejewski (2020) to mitigate internal validity threats. It also aligns with Bakhtiari Moghadam et al. (2023) emphasis on assessing initial skill levels prior to intervention in studies focused on critical thinking enhancement in EFL contexts.

Posttest Scores of Students on Critical Thinking Skills. Posttest analysis demonstrated that the experimental group, taught using the Jigsaw strategy, outperformed the control group in critical thinking skills. The higher minimum score within the experimental group indicates that even the lower-performing students benefitted from the cooperative learning approach. These findings strongly support the claims from Shehada et al. (2000) and Tabiolo and Rogayan (2019), who reported significant improvements in critical thinking and academic achievement through Jigsaw-based interventions. The implementation of Jigsaw fosters active participation, accountability, and peer-to-peer teaching, which encourage higher-order cognitive skills as suggested by Jeong (2021) and Elsayed (2022). The variability in posttest scores, measured by the higher standard deviation in the experimental group, may reflect individual differences in engagement and mastery levels, a phenomenon also noted by Bacsal et al. (2022) in diverse educational contexts.

Peer rating result on Students' teamwork skills before and after using the Jigsaw Strategy. The results of the peer rating assessment on students' teamwork skills before and after the implementation of the Jigsaw strategy reveal a significant enhancement in collaborative abilities, with the mean peer rating showing a notable increase after the intervention. This improvement suggests that the Jigsaw strategy effectively fostered a more collaborative and supportive learning environment, allowing students to engage more deeply with their peers and the material. These findings align with previous research, such as Jeong (2021), which emphasizes the positive impact of cooperative learning strategies on teamwork skills, and Kiuk et al. (2021), who found that the Jigsaw method facilitated increased interaction and cooperation among students. The reduction in standard deviation indicates that peer ratings became more consistent, reflecting the Jigsaw strategy's role in fostering a shared understanding of teamwork roles and responsibilities. This aligns with Vygotsky's principles of social constructivism, which posit that

learning occurs through social interaction and collaboration. Overall, the results advocate for the continued integration of innovative teaching strategies like the Jigsaw method in educational settings to enhance teamwork skills, preparing students for collaborative environments in their future academic and professional endeavors.

Peer rating result on Students' teamwork skills before and after using the Lecture Method. The peer rating assessment of students' teamwork skills before and after the implementation of the Lecture Method indicates a modest improvement in collaborative abilities. Prior to the intervention, students exhibited strong teamwork skills, as reflected in their peer ratings. After the Lecture Method was applied, there was a slight increase in the mean peer rating, suggesting that this traditional teaching approach may have contributed to enhancing students' perceptions of their peers' contributions. However, the improvement observed was relatively small compared to the significant gains seen with the Jigsaw strategy. This finding aligns with research by Gholami et al. (2016) and Nurutdinova et al. (2016), which highlights the limitations of traditional lecture methods in fostering active engagement and critical thinking among students. While the Lecture Method can effectively deliver foundational knowledge, it often lacks the interactive elements necessary to promote deeper collaboration and teamwork skills. The results suggest that although the Lecture Method maintains a high level of perceived teamwork skills among students, it may not be as effective as more interactive approaches, such as the Jigsaw strategy, in facilitating substantial growth in these skills. Overall, the findings underscore the importance of exploring diverse teaching methodologies that prioritize student interaction and collaboration, as these skills are essential for success in both academic and professional settings. The modest improvement in peer ratings following the Lecture Method indicates that while traditional approaches can provide a solid foundation for teamwork skills, they may benefit from the integration of more interactive and cooperative learning strategies to enhance student engagement and collaboration further.

Observation rating result on Students' teamwork skills using Jigsaw Strategy and Lecture Method. The observation ratings of students' teamwork skills using the Jigsaw strategy and the Lecture Method provide valuable insights into the effectiveness of these teaching approaches in fostering collaboration and engagement among students. The results indicate that students in the experimental group, who participated in the Jigsaw strategy, demonstrated significantly higher levels of teamwork skills compared to those in the control group who were taught using the Lecture Method. This finding suggests that the Jigsaw strategy, with its emphasis on cooperative learning and peer interaction, effectively promotes a more dynamic and supportive learning environment. Research by Hurst et al. (2013) supports this notion, highlighting that social interaction in highly interactive classrooms enhances comprehension and retention, thereby fostering deeper understanding and collaboration among students. In contrast, the observation ratings for the control group indicate that while students exhibited respectable teamwork skills, the traditional Lecture Method may not have facilitated the same level of engagement and collaboration as the Jigsaw strategy. This aligns with findings from Gholami et al. (2016) and Nurutdinova et al. (2016), which emphasize the limitations of lecture-based approaches in developing critical thinking and teamwork skills. The significant difference in observation ratings underscores the importance of incorporating active learning strategies, such as the Jigsaw method, into educational practices to enhance students' teamwork abilities.

In conclusion, the findings from the observation ratings highlight the effectiveness of the Jigsaw strategy in promoting teamwork skills compared to the Lecture Method. The higher observation ratings for the

experimental group reflect improved engagement, collaboration, and critical thinking among students, reinforcing the value of interactive teaching methods in educational settings. These results advocate for the continued integration of cooperative learning strategies like the Jigsaw method, as they not only enhance academic performance but also prepare students for collaborative environments in their future academic and professional endeavors.

Difference between the pretest and posttest scores of the students using Jigsaw Strategy. The analysis of the difference between the pretest and posttest scores of students using the Jigsaw strategy reveals a significant improvement in critical thinking skills following the intervention. The pretest scores indicated a foundational level of critical thinking among students, while the posttest scores demonstrated a marked enhancement in their abilities. This substantial increase suggests that the Jigsaw strategy effectively facilitated deeper engagement with the material, allowing students to actively participate in their learning process by teaching and learning from their peers. Research by Tabiolo and Rogayan (2019) supports this finding, indicating that cooperative learning strategies like the Jigsaw method significantly enhance students' academic performance and critical thinking skills. The collaborative nature of the Jigsaw strategy encourages students to evaluate, synthesize, and explain complex ideas, fostering a more profound understanding of the subject matter.

In conclusion, the findings highlight the positive impact of the Jigsaw strategy on students' critical thinking skills, as evidenced by the significant increase in posttest scores. This improvement reinforces the importance of incorporating cooperative learning strategies in educational practices to enhance student engagement and academic performance. The results advocate for the continued use of the Jigsaw method as a means to foster critical thinking and collaboration among students, ultimately preparing them for the challenges of the modern educational landscape and their future professional endeavors. By adopting innovative teaching approaches that prioritize active learning and peer interaction, educators can significantly enhance students' critical thinking abilities and overall learning outcomes.

Difference between the pretest and posttest scores of the students using Lecture Method. The analysis of the difference between the pretest and posttest scores of students using the Lecture Method indicates a significant improvement in critical thinking skills, although this improvement is less pronounced than that observed with the Jigsaw strategy. While the pretest scores reflected a baseline level of critical thinking among students, the posttest scores demonstrated a positive change following the intervention, suggesting that the Lecture Method, despite its primary focus on content delivery, can still facilitate some growth in critical thinking abilities. However, the magnitude of this improvement highlights the limitations of traditional lecture-based approaches in fostering deeper engagement and collaboration among learners. Research by Gholami et al. (2016) and Nurutdinova et al. (2016) emphasizes that while lectures can effectively convey foundational knowledge, they often lack the interactive elements necessary to promote critical thinking and active participation. Consequently, although the Lecture Method can lead to improvements in critical thinking skills, the extent of these gains may not be as substantial as those achieved through more interactive and collaborative teaching methods, such as the Jigsaw strategy. This aligns with the notion that traditional teaching approaches may not adequately engage students in the learning process, limiting their opportunities to analyze, evaluate, and synthesize information critically. In conclusion, while the findings underscore the positive impact of the Lecture Method on students' critical thinking skills, as evidenced by the significant increase in posttest scores, the relatively modest improvement compared to the Jigsaw strategy highlights the need for educators to explore and implement diverse teaching methodologies that

prioritize active learning and collaboration. By incorporating interactive elements into traditional lecture formats, educators can enhance student engagement and foster critical thinking skills more effectively, advocating for a balanced approach to teaching that combines the strengths of both traditional and innovative methods to prepare students for the complexities of the modern educational landscape and their future professional endeavors.

Significant difference between the Peer rating result of the students before and after the use of Jigsaw Strategy. The analysis of teamwork skills before and after the implementation of the Jigsaw strategy reveals a statistically significant strong positive correlation between peer ratings, indicating that students who were rated higher in their teamwork skills prior to the intervention also received higher ratings afterward. This finding underscores the effectiveness of the Jigsaw method in enhancing teamwork skills among students, aligning with existing literature that emphasizes the importance of collaborative learning environments. Plotnikova and Strukov (2019) demonstrated that collaborative learning significantly improves students' abilities to engage in constructive dialogue and apply their knowledge in practical settings, which are essential components of effective teamwork. Additionally, Basco (2020) highlighted that innovative teaching strategies, such as the integration of infographics and collaborative methods, are crucial for developing competencies in teamwork and critical analysis. The strong correlation observed in this study suggests that the Jigsaw strategy not only reinforces existing teamwork skills but also fosters an environment conducive to further development, thereby preparing students for collaborative challenges in both academic and professional contexts.

Significant difference between the peer rating result of the students before and after the use of Lecture Method. The analysis of teamwork skills before and after the implementation of the Lecture Method reveals a statistically significant very strong positive correlation between peer ratings, indicating that students who were rated higher in their teamwork skills prior to the intervention also received higher ratings afterward. This finding suggests a high degree of consistency in peer evaluations, which may reflect the inherent strengths of the Lecture Method in maintaining established teamwork dynamics. However, it is essential to consider the limitations of traditional lecture approaches, as highlighted in the literature. Research by Gholami et al. (2016) and Nurutdinova et al. (2016) emphasizes that while lectures can effectively convey foundational knowledge, they often fall short in fostering active engagement and critical thinking skills necessary for effective teamwork. Moreover, Liu et al. (2023) noted that innovative practices are needed to complement traditional methods to enhance student interaction and collaboration. The strong correlation observed in this study may indicate that while the Lecture Method can reinforce existing teamwork skills, it may not significantly enhance them, suggesting a need for more interactive and collaborative teaching strategies to fully develop students' teamwork competencies.

Significant difference between the observation rating result of the students using Jigsaw strategy and Lecture Method. The analysis of observation ratings for students using the Jigsaw strategy compared to those using the Lecture Method reveals a significant difference in levels of engagement, collaboration, and critical thinking skills exhibited by the two groups. The experimental group employing the Jigsaw strategy demonstrated notably higher observation ratings than the control group utilizing the Lecture Method, underscoring the effectiveness of the Jigsaw strategy in fostering a more interactive and supportive learning environment where students actively engage with the material and collaborate with their peers. Research supports this notion, as Hurst et al. (2013) found that social interaction in highly interactive classrooms significantly improves comprehension and retention, while

Tabiolo and Rogayan (2019) demonstrated that the Jigsaw method enhances academic performance and fosters active participation during discussions. The significant difference in observation ratings suggests that the Jigsaw strategy effectively promotes teamwork skills by requiring students to rely on one another's strengths and knowledge, aligning with Vygotsky's principles of social constructivism. In contrast, the Lecture Method, while effective for delivering foundational knowledge, often results in passive learning experiences that do not adequately engage students, as highlighted by Gholami et al. (2016) and Nurutdinova et al. (2016). Overall, the findings advocate for the continued exploration and implementation of innovative teaching methods, such as the Jigsaw strategy, to foster essential interpersonal skills and prepare students for collaborative environments in their future academic and professional endeavors.

Conclusion

The findings of this study underscore the significant impact of the Jigsaw strategy on enhancing students' critical thinking and teamwork skills in higher education. The comparative analysis between the experimental group, which utilized the Jigsaw method, and the control group, which followed traditional lecture methods, revealed that the Jigsaw strategy improved critical thinking scores and fostered a more collaborative learning environment. The substantial increase in posttest scores for critical thinking among the experimental group indicates that cooperative learning techniques can effectively engage students in deeper cognitive processes, enabling them to apply their knowledge in practical contexts. Moreover, the positive peer ratings and observation ratings regarding teamwork skills further highlight the effectiveness of the Jigsaw strategy in promoting collaboration and communication among students. Participants reported enhanced interactions and support within their groups, which are essential to effective teamwork. These results align with prior research advocating for cooperative learning approaches that promote engagement and higher-order thinking (Shehada et al., 2000; Jeong, 2021; Bacsal et al., 2022).

In conclusion, the study provides compelling evidence for adopting the Jigsaw strategy as a viable pedagogical approach in higher education. By fostering critical thinking and teamwork skills, this method addresses the limitations of traditional teaching practices and equips students with the competencies necessary for academic success and future employability. As educational institutions continue to seek innovative strategies to enhance learning outcomes, the Jigsaw method stands out as a powerful tool for developing essential skills in students. Future research should investigate the long-term retention of these skills and the adaptability of the Jigsaw strategy across various disciplines.

Recommendation

Based on the conclusions derived from the results of the study, the following recommendations are hereby presented:

1. Implementation of Jigsaw Method**:** Educators should consider incorporating the Jigsaw strategy into their teaching practices across various subjects. This method enhances critical thinking and teamwork skills and promotes active learning and student engagement.
2. Training for Educators: Professional development programs should be established to train educators in the effective implementation of cooperative learning strategies like the Jigsaw method. This training can help teachers understand the pedagogical principles behind the method and how to facilitate collaborative learning environments.

3. Further Research: Future studies should explore the long-term effects of the Jigsaw method on critical thinking and teamwork skills, as well as its applicability in different educational contexts and subjects. Additionally, research could investigate the impact of varying group compositions and dynamics on the effectiveness of the Jigsaw strategy.
4. Integration with Technology: Given the increasing reliance on technology in education, integrating the Jigsaw method with digital tools and platforms can enhance its effectiveness. Educators should explore online collaborative tools that facilitate peer interaction and knowledge sharing, especially in remote or hybrid learning environments.
5. Assessment of Teamwork Skills: Institutions should develop comprehensive assessment tools to evaluate teamwork skills more effectively. This could include peer evaluations, self-assessments, and instructor observations to provide a holistic view of students' collaborative abilities.
6. Encouraging a Culture of Collaboration: Schools and universities should foster a culture that values collaboration and teamwork. This can be achieved through extracurricular activities, team-based projects, and community service initiatives that encourage students to work together and develop their interpersonal skills.

By implementing these recommendations, educational institutions can enhance the learning experience for students, equipping them with essential skills for academic and professional success.

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