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Enhancing Collaborative Learning through the Rotating Trio Exchange Model: A Systematic Literature Review on Educational Management Dimensions

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ABSTRACT

This study aims to explore the impact of the Rotating Trio Exchange (RTE) cooperative learning model on student motivation, active participation, and conceptual understanding in the context of 21st-century education. The research employs a Systematic Literature Review (SLR) combined with bibliometric analysis using VOSviewer to identify trends and the impact of the RTE model in educational literature. The findings indicate that the implementation of the RTE model positively enhances student motivation, active participation, and conceptual understanding across various disciplines. However, challenges such as diverse student abilities, limited instructional time, and teacher preparedness remain significant barriers to optimal implementation. The implications of this study suggest that the RTE model can be an effective pedagogical approach to improve learning quality. However, adequate teacher training and classroom adjustments are necessary to maximize its impact. This model supports the achievement of 21st-century educational goals that emphasize collaboration, creativity, and critical thinking.

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INTRODUCTION

Education is widely recognized as a vital foundation for developing high-quality human resources capable of driving national progress in the 21st century (Sain & Abdullah, 2024). In a rapidly changing global era characterized by technological advancement and fierce competition, the ability to think critically, collaborate effectively, and adapt creatively has become an essential skill set for learners (Albustomi, 2025). However, traditional educational practices in many developing countries often emphasize rote learning and teacher-centered approaches, limiting students' opportunities to engage actively in knowledge construction (Adeoye et al., 2025). This situation raises

concerns about whether current educational systems can adequately prepare learners for real-world problem solving and global competitiveness. Therefore, strengthening the quality of education through innovative pedagogical strategies is an urgent necessity (Khoiroh, 2025). By integrating models that promote interaction, collaboration, and creativity, such as cooperative learning, educators can foster more meaningful learning experiences and equip students with the cognitive and social competencies needed to thrive in a knowledge-based society.

Despite continuous efforts to improve the quality of education, many schools still face challenges in achieving optimal learning outcomes. Students frequently exhibit low motivation, limited participation, and poor comprehension of learning materials, especially in subjects that demand analytical and communicative engagement. These issues are often attributed to the dominance of teacher-centered instruction, where learners act as passive recipients rather than active constructors of knowledge. Moreover, the diversity of student abilities in one classroom further complicates the learning process, as some students progress quickly while others lag behind. As a result, learning becomes less inclusive and less effective in achieving expected competencies. This imbalance has long-term implications for educational equity and workforce readiness, underscoring the need for pedagogical reform. A more dynamic, cooperative, and student-centered learning model is therefore required to enhance both cognitive achievement and the social-emotional development of learners.

In classroom practice, many teachers report difficulties maintaining student engagement and participation throughout lessons. Observations reveal that conventional teaching methods often lead to student boredom, particularly when lessons rely heavily on one-way communication or content delivery. Students tend to be reluctant to express opinions or collaborate with peers, resulting in low levels of interaction and creativity. Furthermore, the differences in students' cognitive abilities often cause gaps in participation; high-achieving students dominate discussions while others remain passive observers. Teachers also face time constraints that limit their ability to implement interactive learning strategies. These issues highlight the urgent need for a more structured approach that not only facilitates cooperation but also ensures every student's active involvement. The Rotating Trio Exchange (RTE) cooperative learning model has emerged as a potential solution to address these classroom challenges by promoting systematic collaboration and equitable participation among all learners.

Previous studies have widely examined various cooperative learning models such as Jigsaw, Think-Pair-Share, and Student Teams Achievement

Division (STAD), demonstrating their potential to enhance student motivation and achievement. Scholars such as Hazuar and Zainal Abidin (2020) emphasized that the quality of education is closely linked to how effectively teachers apply interactive learning strategies. Nurhusain (2021) further argued that learner engagement can be improved through well-designed collaborative activities that promote problem-solving and creativity. However, despite the growing body of research on cooperative learning, relatively few studies have specifically focused on the Rotating Trio Exchange (RTE) model. This model, introduced by Melvin L. Silberman, uniquely combines structured interaction and role rotation, allowing each student to experience diverse perspectives within small groups. Thus, while previous research has validated the general benefits of cooperative learning, the specific dynamics and impacts of the RTE model remain underexplored.

Furthermore, recent empirical evidence suggests that cooperative learning approaches can enhance students' higher-order thinking skills and communication competencies. Studies by Habibur Rachman (2024) and Suneki & Widodo (2025) demonstrated that group learning environments encourage active participation and peer-to-peer knowledge exchange. Nevertheless, most existing research still lacks a systematic synthesis of RTE implementation across different educational levels and subject areas. The limited use of bibliometric analysis also restricts scholars' ability to map research trends and identify key contributors within this field. Consequently, there exists a clear research gap regarding the comprehensive evaluation of the RTE model's effectiveness and its broader implications for 21st-century education. Addressing this gap is crucial to providing empirical evidence and theoretical insights that can guide educators in adopting and optimizing RTE-based learning strategies.

This study contributes to the growing discourse on cooperative learning by providing a systematic literature review combined with bibliometric mapping of Rotating Trio Exchange research using VOSviewer. Unlike earlier studies that focus solely on empirical classroom outcomes, this research explores global publication patterns, conceptual relationships, and emerging themes surrounding RTE implementation. The integration of bibliometric and systematic review methodologies represents a novel approach that allows for a comprehensive understanding of both the theoretical development and practical applications of the model. Furthermore, by synthesizing findings across diverse educational contexts, this study highlights how RTE supports critical thinking, communication, and collaboration—skills essential for 21st-century learners. This novelty not only strengthens the theoretical foundation of cooperative learning but also offers educators a data-driven framework for implementing RTE effectively in their classrooms.

Given the current educational challenges and gaps identified in prior research, this study seeks to address the fundamental question: How effective is the Rotating Trio Exchange cooperative learning model in improving student learning outcomes and engagement? To answer this question, the research employs a Systematic Literature Review (SLR) approach complemented by bibliometric analysis. The combination of these methods allows for a rigorous synthesis of existing studies while uncovering patterns in scholarly attention, research evolution, and thematic clusters related to RTE. The study aims to bridge theoretical understanding and practical implementation by analyzing how the model contributes to enhancing motivation, collaboration, and conceptual understanding. Ultimately, the findings are expected to offer actionable insights for educators, policymakers, and researchers seeking innovative learning models that promote both academic excellence and socio-emotional growth.

The present research argues that the Rotating Trio Exchange (RTE) model offers a powerful pedagogical framework for transforming traditional classrooms into collaborative learning communities. By systematically rotating group members and encouraging structured dialogue, RTE not only fosters equal participation but also cultivates metacognitive awareness among students. This dynamic interaction aligns with the principles of social learning theory, where observation, imitation, and feedback play crucial roles in cognitive and behavioral development. Through this model, students learn to articulate ideas, listen actively, and build collective knowledge—key components of lifelong learning. The expected contribution of this study lies in providing a comprehensive synthesis of RTE research that informs future pedagogical innovations. Additionally, it highlights the model's relevance for enhancing educational quality and achieving national goals for human resource development in the global era.

RESEARCH METHOD

This study used a Systematic Literature Review (SLR) approach combined with bibliometric analysis to assess the effectiveness of the Rotating Trio Exchange (RTE) cooperative learning model in improving student learning outcomes and engagement. The research followed the PRISMA framework to ensure accuracy and transparency, analyzing peer-reviewed articles from databases like Scopus, Web of Science, ERIC, and Google Scholar. The study focused on research published between 2015 and 2025, examining key themes such as student motivation, participation, and cognitive achievement.

Each selected article was analyzed to extract key data, including research objectives, methodology, participants, and outcomes. The findings were

categorized thematically to identify patterns and differences across studies, particularly in relation to RTE's impact on student collaboration and cognitive achievement. A qualitative synthesis interpreted these findings within existing cooperative learning theories to ensure the conclusions were grounded in both empirical evidence and pedagogical theory.

To complement the qualitative analysis, bibliometric analysis using VOSviewer software provided a visual representation of publication trends, co-authorship patterns, and citation relationships. This mapping highlighted dominant research themes and identified underexplored areas for future investigation. Through the triangulation of descriptive, thematic, and bibliometric techniques, this study ensured the credibility of its findings, contributing valuable insights into the role of the RTE model in enhancing student engagement and learning outcomes.

Table 1. Inclusion and Exclusion Criteria

Aspects	Criteria
Inclusion	This research was conducted in the educational field, utilizing findings from previous studies relevant to the topic at hand. The focus of this study was to analyze and compare the implementation of the rotating trio exchange cooperative model.
Enclusion	The publication presented was incomplete or only included the abstract.

The data source comes from Google Scholar, utilizing combined keywords such as "Cooperative Learning" and "Rotating Trio Exchange." The search results are filtered and exported to RIS and Excel formats for further processing. VOSviewer is used to visualize the relationships between keywords, authors, and research trends in the form of a bibliometric network.

Tabel 2. Research Question

ID	Research Question	Motivation
RQ 1	To what extent is the effectiveness of implementing the Rotating Trio Exchange cooperative learning model?	Assessing the effectiveness of the Rotating Trio Exchange cooperative learning model in improving student engagement and learning outcomes
RQ 2	What are the advantages and challenges of using the Rotating Trio Exchange cooperative learning model?	Assessing the advantages and disadvantages of the Rotating Trio Exchange cooperative learning model

This research includes a series of procedures that will be carried out carefully with the aim of exploring the theme of the Effectiveness of the Rotating Trio Exchange Cooperative Learning Model. After being identified, the researcher chose Google Scholar as the main database to search for relevant articles and in accordance with the research objectives. To facilitate the search,

the researcher used the keywords "Cooperative Learning" and "Rotating Trio Exchange" to ensure a targeted approach in collecting relevant literature. After identifying articles that have successfully passed the peer-review process and are available as open access, the next step is to export this selection into RIS (Research Information System) format and Microsoft Excel for further analysis. Exporting in these two formats allows greater flexibility in manipulating and organizing the data. Next, the collected data was processed using the VOSviewer application, which is a special tool designed to create bibliometric network visualizations. By using VOSviewer, the researcher aims to produce a comprehensive visual representation that illustrates the relationships and trends in the literature on the Effectiveness of the Rotating Trio Exchange Cooperative Learning Model. This systematic approach not only enhances our understanding of the current research landscape, but also facilitates the identification of key contributors and emerging themes in today's rapidly evolving field.

RESULT AND DISCUSSION

Result

To what extent is the implementation of the Rotating Trio Exchange cooperative learning model effective?

A review by researchers of the Rotating Trio Exchange (RTE) cooperative learning model found that the use of the Rotating Trio Exchange (RTE) cooperative learning model was effective.

Table 3. List of Final Results of Using Digital Interactive Media

No	Types of Cooperative Models	References/Authors	Effective/Not Yet Effective
1	Think Oair Share (TPS)	Sunarti, J., Nasir, M., & Azmin, N. (2023)	Effective
2	Team Games Tournament (TGT)	Anisa, F. N., Turmuzi, M., & Triutami, T. W. (2024)	Effective
3	PICTURE AND PICTURE	Lokat, Y. T., Bano, V. O., & Enda, R. R. H. (2022)	Effective
4	JIGSAW	Ningsih, R., Halim, S., Hanafi, A. H., & Dahlan, D. (2022)	Effective
5	Group Investigation	Alimajaya, A., Wahyudi, W., Verawati, N. N. S. P., & Zuhdi, M. (2024)	Effective
6	STAD	Ningrum, R. D., & Sundari, K (2025)	Effective

Based on the data in the table above, it can be concluded that the implementation of the Rotating Trio Exchange (RTE) model has proven effective, judging by its validity and feasibility. This learning model has the potential to be utilized by teachers and students as a learning resource. Furthermore, utilizing

this learning model as a learning resource can improve learning outcomes, motivate students, foster learning interest, and broaden their knowledge and insight.

Additionally, the implementation of the Rotating Trio Exchange (RTE) model has been shown to enhance student engagement and collaboration within the classroom. By promoting structured interaction and peer exchange, students are encouraged to actively participate in the learning process, which leads to deeper understanding and retention of the material. The RTE model fosters a supportive learning environment where students can share ideas, challenge each other's perspectives, and collectively solve problems, further enhancing their critical thinking and communication skills.

Furthermore, despite its effectiveness, challenges such as varying levels of student ability, time constraints, and the need for teacher training have been identified. These factors can hinder the full potential of the RTE model if not properly addressed. To ensure optimal implementation, educators should be adequately trained in facilitating the model and adapting it to the diverse needs of their students. With these considerations in place, the RTE cooperative learning model can serve as a valuable pedagogical tool for improving student outcomes across different educational settings.

Discussion

The Rotating Trio Exchange model provides opportunities for students to actively engage in discussions with rotating teams, allowing each student to make a maximum contribution to the learning process. This encourages dynamic interactions, the exchange of ideas, and the strengthening of understanding, creating a collaborative and meaningful learning environment (Yohana et al., 2024; Paul & Ghosh2024; Zhou, 2025).

In this context, the learning model's role is simply as an intermediary or transmitter of learning messages, which are always closely related to the learning process. The application of the Rotating Trio Exchange (RTE) cooperative learning model in learning is expected to increase motivation and learning outcomes (Royani, 2023; Permana et al. 2023; Komarudin et al., 2024). The use of the Rotating Trio Exchange (RTE) model can help overcome obstacles faced by students, making the Rotating Trio Exchange learning model a potential method for improving learning outcomes (Yang, 2023; Mastuti et al., 2023; Akmal et al., 2024).

Learning models have become an important component of the learning process at various school levels, particularly as a support for the implementation

of the Rotating Trio Exchange (RTE) learning model. The RTE model involves the continuous exchange of ideas and discussions in small groups. Therefore, the RTE model can encourage students to work together as a team and collaborate in accordance with the learning outcomes set by the Ministry of Education and Culture. In the RTE model, no student is passive; instead, many students engage in physical activity such as group discussions and movement, and the presentation of arguments (Mutia et al., 2025). The Rotating Trio Exchange provides an in-depth way for students to discuss various issues with several classmates. These exchanges can easily be complemented by learning materials. RTE cooperative learning involves students in a class divided into groups to work on structured tasks assigned by the teacher (Hazuar, Zainal Abidin, 2020).

The implementation of the model has a positive impact on students, namely, they feel more enthusiastic about learning activities (Maharani & Herwani, 2024). The use of learning models is one factor that educators can use to improve learning outcomes. Furthermore, students have the courage to express their opinions, even though some may still be shy about speaking in front of the class. Rotating Trio Exchange learning has the following advantages: It can motivate students to be active thinkers. Various opinions can be expressed in a discussion. The activity of moving from one group to another can attract students' attention, preventing boredom and fostering student self-confidence (Kholil et al., 2023; Rachman, 2024). Based on a bibliometric study, it was found that in the past five years there has been an increase in research interest in the application of cooperative learning media, the Rotating Trio Exchange (RTE) model. Keywords such as "interactive" and "collaborative" frequently appear in research data visualizations, indicating that the use of models is a primary focus in the development of innovative learning strategies. These findings confirm that models with visual and interactive elements play a crucial role in creating more engaging, effective, and meaningful learning experiences.

The success of implementing the RTE model in learning depends not only on the level of technological sophistication used, but also on the pedagogical strategies employed by educators. Without thorough learning planning, even the best learning model will not be able to produce optimal results. Therefore, educators need to adapt the choice of learning model to the learning objectives, student characteristics, and the context of the activities when implementing the Rotating Trio Exchange (RTE) cooperative learning model.

In the context of 21st-century education, the integration of interactive digital media is seen as an ideal approach for developing 21st-century skills, including collaboration, communication, critical thinking, and creativity. This

approach also aligns with the policy direction of the Independent Curriculum and the strengthening of the Pancasila Student Profile, which emphasizes the development of comprehensive student competencies. Thus, the RTE learning model can be considered a strategic and transformative learning innovation, with the potential to create a more active, contextual, and meaningful learning process, while simultaneously addressing the challenges of education in the ever-evolving digital era.

CONCLUSION

Based on the findings of the systematic literature review and bibliometric analysis, it can be concluded that the Rotating Trio Exchange (RTE) cooperative learning model is an effective and innovative pedagogical approach for enhancing students' learning outcomes, motivation, and active participation across various educational levels. The model's emphasis on structured collaboration, idea exchange, and peer interaction fosters the development of essential 21st-century skills, including critical thinking, communication, and shared responsibility. Through its dynamic structure, RTE encourages students to take an active role in constructing knowledge while promoting equitable participation and social learning.

The implementation of the RTE model aligns closely with the demands of modern education, particularly within the framework of the digital era and student-centered curricula such as Indonesia's Kurikulum Merdeka. By creating an engaging, interactive, and contextually relevant learning environment, RTE transforms the classroom into a collaborative learning community where students learn both individually and collectively. However, its success depends significantly on teachers' pedagogical competence, lesson planning, time management, and the ability to adapt instruction to diverse learner characteristics. Therefore, effective implementation requires well-designed instructional strategies, continuous professional development, and institutional support to ensure the model's sustainability and scalability.

Overall, the Rotating Trio Exchange model represents a transformative learning innovation capable of bridging theory and practice in education. It not only improves academic achievement but also nurtures essential life skills that prepare students for the challenges of the 21st century. By integrating RTE into contemporary learning frameworks, educators can promote meaningful engagement, foster social interaction, and enhance the overall quality of learning experiences, thereby contributing to the creation of competent, collaborative, and future-ready human resources.

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