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COLLABORATION IN TEACHING: THE ROLE OF TEACHERS, STUDENTS, AND TECHNOLOGY IN EFFECTIVE LEARNING

David Darwin
Universitas Darma Persada

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Abstract

This study aims to analyze the roles of teachers, students, and technology in building effective collaborative learning. Using descriptive qualitative research methods, data were collected through in-depth interviews, observations, and documentation with teachers and students in a school environment that has implemented collaboration-based learning. The results show that teachers act as facilitators, motivators, and directors, students play an active role in discussions and collaboration, while technology functions as an interactive medium that expands the learning space. Factors supporting collaboration include teacher pedagogical competence, student motivation, an open learning culture, and technological infrastructure support. The main obstacles are limited access to technology, low digital literacy, and differences in student engagement levels. Overall, the collaboration of these three elements has been proven to increase engagement, motivation, and learning effectiveness, while also emphasizing the need for an adaptive collaboration model in the digital era.

Keywords: *collaboration, teachers, students, technology*

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Corresponding Author:
David Darwin
daviddarwin8299@gmail.com

1. Introduction

21st century education demands strong collaborative skills between teachers and students as part of the core competencies that must be developed in the learning process (Randitha Missouri et al., 2025, p. 21). Collaboration is not only defined as working together to complete tasks, but also as a dynamic interaction that allows for the exchange of ideas, joint problem-solving, and strengthening two-way communication in the classroom and through digital platforms. Teachers act as facilitators who create a participatory learning environment, while students play an active role in collectively constructing knowledge. Thus, collaboration is a crucial element in shaping learning patterns that are not only teacher-centered but also position students as empowered subjects (student-centered) (Syaifuddin et al., 2025).

Furthermore, collaboration in education is seen as enhancing students' motivation, creativity, and understanding of the material. When students work together with peers and receive direct guidance from teachers, they are encouraged to express their opinions more confidently, think critically, and develop innovative solutions to various learning challenges. The learning process also becomes more meaningful because students can see the relevance of the material to real life through discussions and collective experiences (Parisu et al., 2025). Not only that, collaboration also strengthens social skills such as empathy, tolerance, and adaptability, all of which are essential for facing global challenges in the modern era. In other words, collaboration not only improves academic achievement but also shapes holistic 21st-century character and competencies (Yusgiantara et al., 2024).

The role of teachers in modern education is no longer limited to providing material, but has developed into facilitators and directors who help students actively build knowledge (Basyori, 2025). Teachers are required to create a collaborative learning environment, motivate students to engage in discussions, and encourage them to develop critical and creative thinking skills. In this context, teachers act as a bridge between learning materials

and students' real-world needs, making the learning process more relevant, participatory, and meaningful.

However, this new role is not without challenges. Teachers must be able to adapt to the increasingly dominant digital learning technologies, while maintaining the essence of human interaction in the classroom. Reliance on technology without proper management can diminish the emotional closeness between teachers and students, which is crucial for building trust, motivation, and psychological well-being. Therefore, teachers need to develop a balance between the use of technology and a personal approach to teaching, so that the collaboration created is not only academically effective but also supports students' social and emotional development (Melanie Surya & Moramowati, 2023).

The role of students in 21st century learning increasingly emphasizes their activeness and participation as partners in building knowledge (Nuhandini et al., 2025). Students are no longer merely recipients of information, but rather contributing subjects in discussions, collaborations, and knowledge exploration through various sources. Through active involvement, students can develop critical thinking, communication, creativity, and collaboration skills, essential competencies in the modern era. This role also requires students to be more independent in managing their learning process, including utilizing educational technology as a supporting tool.

However, in practice, many students still tend to be passive and overly dependent on teachers, resulting in a less-than-optimal learning process. This passivity can be caused by various factors, such as teacher-centered learning methods, low motivation to learn, or limited skills in using technology. These conditions pose unique challenges in creating effective collaborative learning (Febrian Afriadi et al., 2024). Therefore, strategies are needed that encourage students to be more courageous in expressing their opinions, actively participating, and developing a sense of responsibility in the learning process, so that they truly become true partners in education.

The role of technology in modern education is crucial as a tool to support collaborative learning, both in the classroom and online. Technology enables teachers and students to interact more broadly through digital platforms, facilitates access to diverse learning resources, and opens up space for discussion and collaboration without the constraints of time and space (Anita Candra Dewi, 2024). Through the use of learning applications, discussion forums, and interactive media, students can collaborate on projects, share ideas, and develop digital communication skills relevant to 21st-century needs. Thus, technology serves not only as a complement but also as a catalyst that enriches collaborative learning experiences.

However, the use of technology in learning is often limited to one-way delivery of material, thus not fully supporting in-depth collaborative interactions. Many teachers and students still use technology only for presentations or accessing information, without maximizing collaborative features such as online discussions, virtual group work, or digital project-based learning (Ginusti, 2023). These obstacles can be caused by limited digital literacy, unequal access to technology, or a lack of teacher training. Therefore, technology utilization needs to be directed not only as an information medium but also as a space for active interaction, participation, and collaboration that truly supports collaborative learning goals.

The research gap in this area lies in the limitations of existing studies, where most previous studies have only focused on the use of educational technology in isolation without simultaneously linking it to the roles of teachers and students. The integration of the roles of teachers, students, and technology within a collaborative learning framework remains scarce, resulting in a lack of in-depth understanding of how all three can work together to create effective learning.

The novelty of this research lies in its approach, which offers a fresh perspective by highlighting the collaboration of three key elements simultaneously teachers, students, and technology in creating effective learning. Rather than examining each role separately, this research presents a comprehensive picture of how all three can complement and interact

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within a collaborative framework, resulting in a more comprehensive understanding of modern learning relevant to the demands of the 21st century.

The purpose of this study is to describe in depth the roles of teachers, students, and technology in building collaborative learning, and to identify factors that support and hinder the creation of such collaboration in teaching practice. Furthermore, this study aims to provide recommendations for effective, technology-based collaborative learning models, thus serving as a reference for developing educational strategies relevant to the needs of the digital era and the demands of 21st-century learning.

2. Method

This research method uses a qualitative approach with a descriptive design to deeply understand the dynamics of collaboration between teachers, students, and technology in the learning process (Wahyudi et al., 2024). The research was conducted in schools or educational institutions that have implemented collaborative learning, with the main subjects being teachers as learning designers and implementers, students as active participants, and related parties such as school principals or education staff as additional informants. Informants were selected using purposive sampling techniques based on certain criteria, for example, teachers who consistently implement collaborative learning models or students who actively use technology in the learning process.

Data was collected through in-depth interviews with teachers and students, participatory observation of learning activities in the classroom and on digital platforms, and documentation in the form of notes, photos, or recordings of the learning process (Rahma & Mufidah, 2025). The research instruments included semi-structured interview guidelines, observation sheets, and field notes, while data analysis was conducted using the Miles & Huberman interactive model through the stages of data reduction, data presentation, and conclusion drawing/verification. To ensure the validity of the data, source triangulation (teachers, students, documents) and technical triangulation (interviews, observations, documentation) were used, as well as member checks with informants. Ethical aspects of the research were also considered, including maintaining the confidentiality of participants' identities, obtaining informed consent, and respecting the norms and rules of the school where the research took place.

3. Results and Discussion

Table 1. Relationship between the Roles of Teachers, Students, and Technology in Collaborative Learning

Collaboration Aspects	The Role of Teachers	Student Role	The Role of Technology	Impact on Effective Learning
Planning	Designing collaborative learning strategies	Conveying learning needs and self-readiness	Support planning through the platform	Learning according to student needs
Implementation	Facilitator and motivator	Actively discuss, collaborate, and share ideas	Become an interactive media (LMS, application)	Students are more involved and participatory

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Evaluation	Providing collaborative feedback	Reflecting on learning outcomes in groups	Providing digital learning outcome data	More comprehensive evaluation
Obstacle	Difficulty adapting to technology	Some students are passive, lack motivation	Limited access, low digital literacy	Collaboration is not yet optimal
Supporting Factors	Pedagogical competence, management support	Learning motivation, communication skills	Adequate technological infrastructure	More effective collaboration

Source: 2025 Data Processing Results

The table illustrates the interrelationship between the roles of teachers, students, and technology in building effective collaborative learning. In the planning stage, teachers play a role in designing collaborative learning strategies, while students provide input regarding learning needs, and technology supports this by providing a platform that can be used as a preparation tool. As a result, learning becomes more tailored to students' needs.

During the implementation phase, teachers act as facilitators and motivators, while students actively participate in discussions and share ideas, while technology serves as an interactive medium (such as a Learning Management System or collaboration app). This encourages higher student engagement and creates a participatory learning environment. In the evaluation phase, teachers provide collaborative feedback, students engage in group reflection, and technology provides digital learning data for analysis. Consequently, evaluation is more comprehensive because it assesses not only the final outcome but also the collaborative process.

However, implementation has faced challenges. Teachers still struggle to adapt to technology, some students tend to be passive and unmotivated, and limited access and low digital literacy mean technology's role is suboptimal. This results in less than optimal collaboration.

Conversely, there are also supporting factors such as teacher pedagogical competence, student motivation, communication skills, and adequate technological infrastructure. These factors strengthen collaboration, making learning more effective, interactive, and oriented toward 21st-century skills.

The Role of Teachers in Collaborative Learning

Teachers in modern learning are no longer positioned only as conveyors of material, but more as facilitators, motivators and directors who support students in building their own knowledge.(Wafula, 2024). In this role, teachers are required to create a participatory learning environment, encourage two-way interaction, and facilitate collaboration between students to achieve deeper understanding. Collaborative-based teaching strategies have been shown to increase student engagement, across cognitive, affective, and social dimensions, as they are actively involved in the learning process.

However, this new role of teachers also presents its own challenges, especially in terms of adapting to the increasingly rapid development of educational technology (Riswanto & Mulyanti, 2024). Many teachers still struggle to integrate technology into collaborative learning, either due to limited digital skills, inadequate resources, or resistance to changes in teaching methods. These challenges need to be addressed through ongoing training, institutional support, and the development of a learning culture open to innovation, so that teachers can optimally fulfill their role in supporting collaborative learning in the digital age.

The Role of Students in Collaboration

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Students in collaborative learning are required to be more active in discussions, share ideas, and contribute to completing group assignments. This involvement not only improves understanding of the material but also trains communication, critical thinking, and problem-solving skills, which are highly relevant to the needs of the 21st century (Adawiyah & Jennah, 2023). Through collaboration, students learn to listen to others' opinions, express ideas, and work together to find solutions to problems presented in the learning process.

Furthermore, collaboration fosters a sense of responsibility, cooperation, and independent learning, which are crucial for shaping student character. However, challenges persist, such as the tendency for some students to be passive, lacking in self-confidence, or relying more on teachers or more dominant peers. This situation demonstrates that the teacher's role remains crucial in providing encouragement, direction, and learning strategies that can stimulate the active participation of all students, ensuring that collaboration truly runs optimally (Ruslandi et al., 2025).

The Role of Technology in Supporting Collaboration

Technology in collaborative learning serves as an interactive medium that can expand learning spaces beyond the boundaries of the traditional classroom. This is achieved through digital platforms such as Learning Management Systems (LMS), discussion apps, and video conferencing (Ningtyas et al., 2024), interactions between teachers and students become more flexible, open, and continuous. Technology serves not only as a means of delivering material but also as a communication bridge, a discussion space, and an evaluation tool that can increase student engagement and engagement in the learning process.

However, the use of technology to support collaborative learning still faces several obstacles. Limited infrastructure in some schools, low digital literacy, and unequal internet access are significant barriers. This can reduce the effectiveness of technology-based collaborative learning, especially for students without adequate facilities. Therefore, policy support, the provision of more inclusive facilities, and digital competency improvement programs for both teachers and students are needed to ensure technology can be optimally utilized to support collaborative learning.

Supporting Factors for Collaboration

The success of collaborative learning is heavily influenced by several important factors, including school management support, teacher and student readiness, and appropriate technology utilization. School management plays a role in providing policies, facilities, and a conducive work environment, while teachers and students are required to have the skills and mental readiness to actively participate in the collaborative process. The technology used must also be relevant, easily accessible, and truly support interaction between all parties involved (Sajdah et al., 2024, p. 21).

Furthermore, a learning culture that emphasizes cooperation and open communication is a crucial foundation for creating an effective collaborative learning environment. With this culture, both teachers and students can more easily build mutual trust, respect differences of opinion, and work together to achieve learning goals. This makes collaboration not only a teaching method but also an ingrained value in the educational process.

Factors Inhibiting Collaboration

Several challenges remain in implementing technology-based collaborative learning, one of which is the digital divide among students. Not all students have access to adequate devices or internet connections, often hindering their participation in learning. This situation has the potential to create inequalities in accessing the same learning experience (Mardiyah et al., 2025).

Furthermore, teachers' heavy workloads are also a challenge, as they must prepare materials, manage interactions, and adapt to new technologies. Furthermore, resistance to changes in learning methods, from both teachers and students, also slows down the implementation process. Some remain comfortable with conventional learning patterns,

making them less open to innovation. This highlights the need for ongoing mentoring, training, and support strategies to minimize these challenges.

The Impact of Collaboration on Effective Learning

The impact of collaboration on effective learning is evident in increased student motivation and engagement in the learning process, the creation of a more participatory learning environment, and the development of 21st-century skills such as critical thinking, creativity, collaboration, and communication. Through directed interactions between teachers and students, coupled with technological support, learning becomes more meaningful because students not only receive information but also actively participate in constructing knowledge together.

Discussion with previous research indicates that this study reinforces the findings regarding the importance of technology in improving the quality of learning, but also adds a new dimension related to the interaction between teachers and students that has not received much attention. The main contribution of this study lies in its emphasis on integrating the roles of teachers, students, and technology within a collaborative framework, thus providing a more comprehensive understanding of how all three can synergize to create effective learning in the digital era (Fuady & Rizaldi, 2024).

4. Conclusions and Suggestions

The conclusion of this study shows that collaboration between teachers, students, and technology is key to creating effective and participatory learning. Teachers act as facilitators, motivators, and directors to encourage student engagement through collaborative strategies, while students are required to actively discuss, share ideas, and collaborate, although some still exhibit passive attitudes. Technology functions as a supporter of collaborative interactions by providing interactive learning spaces, but its effectiveness is greatly influenced by infrastructure readiness and digital literacy. Factors supporting collaboration include teacher pedagogical competence, student motivation, an open learning culture, and technological infrastructure support. While the main obstacles lie in limited access to technology, teacher workload, and differences in student readiness. Overall, this study emphasizes the importance of synergy between the roles of teachers, students, and technology, as well as the need for adaptive collaboration models to address the challenges of learning in the digital era.

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