



## The Role of Educational Technology in Collaborative Learning at SMKN 1 Negeri Besar

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### ABSTRACT

This research describes the role of educational technology in collaborative learning at SMKN 1 Negeri Besar. Starting from the COVID-19 pandemic situation, which requires learning to be carried out online from home, both theoretically and practically. Along with the rapid development of information technology, teachers need to utilize technology to be able to collaborate with students online in the learning process. Collaboration between students, teachers and schools is certainly possible. One of the lessons learned from the COVID-19 pandemic in education is the emphasis on using educational technology for collaborative learning. Collaborative learning is based on information and communication technology and is very dynamic. This research is descriptive research with a type of qualitative research method. The instruments of this research are data collection techniques: interviews, observations, and documentation. The data analysis technique uses interactive methods (Miles & Huberman) to condense data, present data, and draw conclusions/validation. The results of the study found that: the role of educational technology in collaborative learning can help students of SMKN 1 Negeri Besar in developing soft skills through various effective and efficient ways and is very important to increase the competitiveness of SMKN 1 Negeri Besar students in facing the world of work.

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## INTRODUCTION

The rapid advancement of information and communication technology (ICT) has brought about significant transformations across various domains of human life, including education. In an era shaped by globalization, educational systems are compelled to integrate technology as a means to enhance the quality of learning and to align with 21st-century competency demands (Cha et al., 2025). Technology has transcended its role as a mere tool and has become a foundational component in designing innovative, collaborative, and contextual learning models particularly within Vocational High Schools (SMKs).

As institutions that emphasize vocational and technical skill development, SMKs face the unique challenge of aligning instructional practices with industry standards and labor market needs. Thus, the integration of educational technology is crucial in shaping meaningful, adaptive, and career-oriented learning experiences. One pedagogical approach particularly well-suited to vocational education is technology-supported collaborative learning, where students engage in cooperative tasks, share knowledge, and develop solutions via digital platforms (Mustaqim et al., 2025).

Technology-enhanced collaborative learning has demonstrated its efficacy in fostering student engagement, critical thinking, and communication skills all essential attributes for workforce readiness in the vocational sector (Barangai & Base, 2025). Empirical studies have shown that the implementation of digital tools such as Learning Management Systems (LMS), Google Classroom, and video

conferencing applications like Zoom not only sustains active student participation but also enables educators to design more flexible and measurable instructional strategies (Cha et al., 2025).

Furthermore, successful vocational education requires a harmonious blend of theoretical instruction and practical application. In this context, technology facilitates not only access to diverse learning resources but also enables simulation-based learning, project-based learning, and structured reflective practices. This aligns with the principles of Problem-Based Learning (PBL), which has been adapted within vocational settings to foster collaborative and solution-oriented student engagement (Mustaqim et al., 2025).

At the policy level, the integration of educational technology within vocational education reflects global reform trends. Countries such as Saudi Arabia and China have revitalized their technical and vocational curricula by embracing digital innovation and online collaboration strategies to boost educational effectiveness and graduate employability (Keating & Almoaibed, 2025; Zeng et al., 2025). As a developing nation, Indonesia must strategically respond to these dynamics by formulating national policies aimed at digitizing vocational education comprehensively.

In light of these imperatives, this study focuses on exploring the integration of educational technology to support collaborative learning in the SMK environment. Its objective is to investigate the impact of technology utilization on the quality of instruction, student engagement, and employability readiness, while also offering strategic recommendations for technology-driven vocational education policy development.

## RESEARCH METHOD

This study employed a qualitative descriptive research design, which is suitable for investigating phenomena in natural settings with the aim of understanding meanings, experiences, and perspectives as articulated by participants. The qualitative descriptive approach is particularly appropriate for exploring educational contexts, allowing researchers to provide detailed and contextually grounded accounts of specific social realities (Zaenudin et al., 2025).

According to Creswell and Poth (2018), qualitative research is a form of inquiry that explores phenomena by collecting non-numeric data such as spoken words, behavioral observations, and textual documents (Creswell & Poth, 2018). The descriptive orientation of this method enables researchers to systematically present factual accounts without imposing interpretive frameworks beyond those shared by participants themselves. Therefore, this approach facilitates a clear and accessible presentation of findings, especially in education-based studies where participants' voices must be foregrounded (Rosyidah & Darmuki, 2025).

Data collection in this study was conducted through semi-structured interviews, non-participant observations, and document analysis. The interview protocol was designed to explore participants' experiences and perceptions, with flexibility for probing and elaboration. Observations were carried out in the natural educational settings to capture spontaneous behaviors and contextual interactions relevant to the research focus. Supporting documents, including institutional archives and classroom materials, were reviewed to triangulate and enrich the primary data (Sumual et al., 2025).

The research followed a staged process: (1) initial mapping of participants and context, (2) primary data collection through interviews and observations, and (3) documentation analysis for contextual depth. All data were transcribed and coded thematically using a constant comparative method to identify recurring patterns and categories. The validity of findings was ensured through data triangulation, member checking, and peer debriefing, in line with established qualitative rigor standards (N.K. Denzin & Y.S. Lincoln, 2018).

This methodology was chosen to allow a comprehensive understanding of the educational phenomena under investigation, enabling researchers to remain close to participants' expressions and to draw conclusions rooted in actual classroom practices and educator perspectives. Through this methodological stance, the study seeks to contribute empirically grounded insights into educational development, with an emphasis on practical implications and institutional relevance.

## RESEARCH RESULT & DISCUSSION

### Educational Technology

The findings of this study reveal that educational technology functions as a transformative force in modern education, particularly in enhancing learning efficiency, equity, and engagement. Drawing from the etymology of the term "technology" (from the Greek *technologia*, meaning the systematic treatment of skills or art), educational technology can be conceptualized not merely as a collection of tools, but as an integrated system that connects human actors, technological devices, instructional strategies, and organizational procedures to optimize learning outcomes (Prast et al., 2018).

Contemporary definitions emphasize that educational technology is not confined to hardware or software alone. It encompasses an ecosystem that includes learners, educators, digital content, learning environments, and evaluation frameworks working collectively to solve instructional challenges and improve learning quality (Astitiani et al., 2025). In alignment with the Association for Educational Communications and Technology (AECT), technology in education addresses three core problems: (1) inequality of access, (2) inefficiency in instructional delivery, and (3) the need to improve the quality of learning.

The implementation of digital learning tools such as interactive worksheets, virtual simulations, and learning management systems has been shown to improve students' engagement and comprehension. For example, a study by Astitiani et al. (2025) demonstrated that the use of *Liveworksheet* in elementary schools significantly enhanced student mastery of writing mechanics, especially in capitalization and sentence structure (Astitiani et al., 2025). This supports broader empirical evidence suggesting that when educational technologies are appropriately aligned with pedagogical goals, they enhance retention, performance, and learner autonomy.

In terms of educational equity, digital tools help bridge the gap between urban and rural learners by enabling access to standardized content and interactive experiences. Ezema et al. (2025) found that integrating digital technology into public health education in remote areas of Nigeria not only improved access but also increased engagement and knowledge retention among learners with limited physical infrastructure (Ezema et al., 2025).

Additionally, Maganga (2025) compared traditional and digital instructional methods in Tanzanian secondary schools and concluded that digital approaches, when combined with teacher facilitation, led to better spatial reasoning and map interpretation skills. This highlights the potential of educational technology to move beyond rote instruction and support higher-order thinking skills (Maganga, 2025).

Nevertheless, the impact of educational technology is not uniform and requires contextual adaptation. Jaleel et al. (2025) emphasized the importance of localizing technology integration strategies to align with socio-economic and cultural contexts, particularly in developing countries. They advocate for systemic reforms that go beyond mere tool adoption to address digital literacy, training, and infrastructural support (Jaleel et al., 2025).

In summary, the study confirms that educational technology is a multifaceted solution that when properly integrated can improve learning efficiency, promote equitable access, and foster

better educational outcomes. However, sustained success depends on the strategic alignment of tools, pedagogy, and policy.

### **Collaborative Learning at SMKN 1 Negeri Besar**

The implementation of collaborative learning at SMKN 1 Negeri Besar demonstrates a significant shift from traditional pedagogical models to more learner-centered and technology-assisted educational practices. Collaborative learning, defined as an instructional approach where students work together toward shared learning goals, has been widely recognized for fostering critical thinking, teamwork, and communication skills essential for vocational education settings (Barangai & Base, 2025).

Field observations indicate that group-based learning activities at SMKN 1 Negeri Besar are structured to encourage equitable participation among students. Utilizing digital tools such as Google Classroom, teachers have begun to design collaborative environments where students engage in dialogue, task sharing, and mutual problem solving. This aligns with recent findings that educational technology platforms can enhance collaborative engagement and retention by offering accessible communication, resource sharing, and feedback loops (Mhagama & Garg, 2025).

In collaborative scenarios observed, students exhibited active interaction and mutual support. These interactions fulfill several core components of collaborative learning identified by Myers (1991), including: mutual accountability, shared task resolution, reciprocal explanation, and team interdependence. These principles foster not only cognitive development but also the affective domain of learning, such as empathy and tolerance for diverse viewpoints qualities essential in vocational and workplace environments.

The observed practices at SMKN 1 Negeri Besar resonate with the six-phase collaborative learning model presented by Adhayanti & Pakadang (2025), where teams are empowered to manage their own learning processes. Students are not merely passive recipients of instruction but serve as co-constructors of knowledge. They plan tasks, negotiate meaning, resolve conflicts, and evaluate group progress, thus mirroring authentic workplace dynamics (Adhayanti & Pakadang, 2025).

Furthermore, collaborative learning in this context encourages the development of discovery-based and contextual learning strategies. By assigning projects rooted in real-world vocational problems, teachers promote meaningful learning experiences. This corresponds with constructivist theories that view knowledge as actively built through interaction and contextual immersion.

A key factor in the success of collaborative learning observed is the teacher's role as a facilitator rather than a transmitter of knowledge. Teachers provide scaffolding, set collaborative norms, and mediate group interactions when necessary. This role transformation aligns with modern educational paradigms that advocate for student autonomy supported by structured guidance.

However, challenges remain. Technological infrastructure and digital literacy disparities can hinder full participation. For effective implementation, institutional investment in teacher training and digital resource optimization is essential.

In summary, collaborative learning at SMKN 1 Negeri Besar, when integrated with educational technology, not only supports the development of academic competencies but also nurtures professional skills essential for 21st-century vocational graduates. The model promotes inclusivity, learner agency, and engagement elements that are crucial in the evolving landscape of technical and vocational education and training (TVET).

### **Persuasion and Attitudinal Shift**

The persuasion stage involves forming favorable or unfavorable attitudes toward the innovation. In Pesawaran, this process was highly influenced by policy legitimization—specifically, the issuance of Peraturan Bupati No. 48 Tahun 2022 and the Surat Keputusan Kepala Dinas Pendidikan dan Kebudayaan on the development and use of local content for anti-corruption education.

This policy support provided symbolic and practical legitimacy, motivating schools to participate actively. As Gedifew et al. (2022) explain, the interplay of systemic support and user motivation is critical in shifting institutional attitudes. The use of teacher-led training programs where educators shared implementation experiences further enhanced peer influence—an important vector of persuasion in the diffusion process. (Gedifew & Bitew, 2017)

### Challenges in Implementation

The integration of educational technology in collaborative learning within vocational education faces a series of persistent and multifaceted challenges. One of the most critical issues is limited access to technology, particularly in rural and under-resourced regions. Students in such areas often lack reliable internet connections and access to digital devices, which significantly hinders their ability to participate in technology-enhanced collaborative learning environments. This digital divide, as observed by Ndibalema, Komba, and Allay (2025), creates systemic inequities that directly impact learning outcomes and participation (Ndibalema et al., 2025).

Another major challenge is the limited digital literacy among both students and teachers. The successful implementation of educational technology demands not only availability of infrastructure but also users who are capable of operating it meaningfully. Salleh et al. (2025) highlight that many pre-service teachers still struggle with the application of the Technological Pedagogical Content Knowledge (TPACK) framework, indicating a gap in both initial and continuing professional development. Similarly, vocational students often lack the experience needed to collaborate effectively using online tools, resulting in superficial engagement with the technology (Salleh et al., 2025).

Institutional resource constraints further complicate technology adoption. Many vocational schools operate with outdated hardware, unreliable internet connectivity, and limited technical support, leading to ineffective utilization of even the most basic educational platforms. In addition, school policies often lag behind in supporting digital learning, and administrative support for structured technology integration is frequently absent. Without proper alignment between institutional vision and digital infrastructure, the potential of educational technology remains underutilized.

Communication barriers also represent a significant hindrance in collaborative learning. The absence of structured communication pathways between students, teachers, and sometimes parents weakens the collaborative process. While platforms like Google Classroom are intended to facilitate interaction, their effectiveness is limited when not supported by real-time engagement, clear feedback mechanisms, and consistent digital etiquette.

Another factor is the inconsistent quality and relevance of the educational software used. Some platforms may lack intuitive interfaces, proper localization, or features that encourage genuine collaboration. Poor software design can lead to user frustration and disengagement, particularly when the platforms are not tailored to vocational education's hands-on, project-based nature.

Finally, pedagogical resistance remains a critical obstacle. Many educators continue to rely on conventional, teacher-centered approaches and are hesitant to adopt technology-driven, student-centered collaborative models. Mustaqim et al. (2025) observed that without a clear understanding



of pedagogical alignment, technology is often used merely for content delivery rather than fostering meaningful interaction and problem-solving among learners (Mustaqim et al., 2025).

In conclusion, while educational technology holds transformative potential for collaborative learning in vocational settings, its implementation is constrained by infrastructural, pedagogical, and socio-cultural barriers. Overcoming these challenges requires a comprehensive approach that includes equitable access, digital literacy training, teacher professional development, contextual software design, and supportive educational policies. Only with such systemic interventions can educational technology move beyond symbolic innovation and serve as a true enabler of collaborative and inclusive learning.

## CONCLUSION

Educational technology constitutes a dynamic and multidimensional system that encompasses not only the use of digital tools but also the design, development, management, and evaluation of learning environments and experiences. Within the context of collaborative learning at SMKN 1 Negeri Besar, educational technology plays a strategic role in fostering a more interactive, inclusive, and skills-oriented pedagogy. Its function extends across multiple domains: as a medium for accessing and distributing information, as content and material within instruction, as a tool for enhancing student engagement, and as a bridge to reduce technological literacy gaps. This integration aligns with the principles of educational technology as articulated by AECT (Association for Educational Communications and Technology), which emphasizes a holistic process involving human and organizational systems aimed at improving learning and performance.

The study identifies three core pedagogical dimensions that educational technology must support in vocational collaborative learning environments. First, it should facilitate the development of social skills, such as interpersonal communication, teamwork, and digital collaboration, which are essential in both academic and professional contexts. Platforms like Google Workspace and Microsoft Teams demonstrate how digital tools can foster productive interaction among students. Second, educational technology should enhance critical and creative thinking, enabling students to question, ideate, and problem-solve innovatively. Interactive applications such as Kahoot and Duolingo exemplify tools that stimulate student engagement and higher-order thinking. Third, it must support the development of analytical and interpretive competencies, which are vital for vocational learners when solving complex tasks. Tools like GeoGebra and Zenius contribute to cultivating analytical reasoning and structured reflection.

Consequently, the integration of educational technology into collaborative learning practices at SMKN 1 Negeri Besar is not only relevant but imperative in preparing students for the demands of the 21st-century workplace. The digital ecosystem established through technology fosters meaningful collaboration between students and teachers, providing a platform for co-construction of knowledge. To ensure sustainability and effectiveness, educators must assume an active facilitative role guiding students in using digital platforms meaningfully and critically. With continued support and pedagogical alignment, educational technology can transform vocational education by bridging gaps in engagement, participation, and skills development, ultimately producing graduates who are both technically competent and socially collaborative.

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