Archipel Journal
E-ISSN : 3124-6621
Vol.1.No.4 December 2025
https://ojsap.com/index.php/archipel/index
DOI : https://doir.org/10.65739/archipel.v1i4.25

Changes in Teacher–Student Interaction Patterns in Digital Learning: Implications for Learning Motivation and Engagement

Ika Rahma
Universitas Islam Negeri sulthan Thaha Saifuddin Jambi, Indonesia

Email: rahmaika609@gmail.com

Submit : September 10, 2025
Revised : October 10, 2025
Accepted: November 20, 2025
Published : December 31, 2025

Abstract

This study examines changes in teacher-student interaction patterns in the context of digital learning and their impact on student motivation and engagement through a literature review approach. A systematic review of scientific publications from the past five years was conducted to identify the dynamics of technology-mediated pedagogical interactions and their consequences on student motivation and engagement in the learning process. The findings indicate that effective interactions in digital environments are positively correlated with student motivation and engagement, particularly through two-way communication, responsive feedback, and technology-based interactive strategies. Variations in pedagogical strategies and teachers' digital literacy readiness are key determinants of the quality of interactive relationships in digital learning. Furthermore, student engagement is measured through affective, cognitive, and behavioral indicators that are influenced by the quality of teacher-student interactions. The literature also indicates that challenges such as limited access to technology and lack of emotional support can hinder motivation and engagement. Thus, this study emphasizes the importance of strengthening pedagogical interactions in digital learning design to improve student learning outcomes. The implications of these findings are suggested as a reference for developing more humanistic and impactful digital education practices.

Keywords:teacher–student interaction; learning motivation; learning involvement

INTRODUCTION

Digital learning has driven fundamental changes in modern education systems, particularly in the way teachers and students interact during the learning process. The shift from face-to-face learning to digital platforms has shifted communication patterns from direct and simultaneous to more structured and reliant on technological media. Pedagogical interactions that once occurred naturally are now largely mediated by devices, applications, and internet networks. This situation affects the intensity of communication and the depth of relationships between teachers and students. These changes are not only technical but also touch the pedagogical and psychological dimensions of learning. Teachers are required to adapt communication strategies to remain effective in the digital space. Meanwhile, students face new interaction patterns that require adaptations in how they participate and respond to learning (Akpen et al., 2024; Deng et al., 2020).

These changes in interaction patterns have implications for the teacher's role as a facilitator and mediator of learning. In digital learning, the teacher is no longer the sole source of information, but rather the director of the learning process, utilizing technology as a supporting tool. Communication patterns tend to be more planned and based on written or visual instructions. This has the potential to reduce the spontaneity of dialogue that typically occurs in face-to-face learning. On the other hand, technology provides new spaces for teachers to provide individualized and documented feedback. The effectiveness of this role depends heavily on the teacher's digital pedagogical skills. Therefore, the quality of interactions is determined not only by technology but also by the teacher's communication competency.

As the role of teachers changes, students' learning experiences also undergo significant shifts. Technology-mediated interactions influence how students perceive the teacher's presence in the learning process. Physical absence can diminish the sense of emotional closeness that previously developed naturally. This has the potential to impact students' perceptions of teacher support and attention. These perceptions are closely linked to students' levels of learning motivation. When interactions feel limited or one-way, students' intrinsic motivation can decline. However, this is not universally true for all students.

Some students actually show increased motivation to learn through digital learning. The flexibility of time and space allows students to adjust their learning rhythm to suit their individual needs. Access to a variety of digital learning resources can also strengthen a sense of autonomy in learning. This autonomy is a crucial factor in developing intrinsic motivation (Kahu et al., 2020; Martin et al., 2020). However, increased motivation is not always accompanied by optimal learning engagement. Without meaningful pedagogical interactions, motivation can be temporary and unsustainable. This suggests that learning

motivation is strongly influenced by the quality of the interactive relationship between teachers and students.

Student engagement in digital learning has undergone changes in form and indicators. Participation is no longer solely demonstrated through active speaking in class, but also through written responses, online activities, and engagement in virtual discussions. The cognitive dimension of engagement is reflected in students' ability to understand and process material independently. Meanwhile, emotional engagement is evident in students' interest, enthusiasm, and attitude toward learning. Behavioral engagement is reflected in consistent attendance and assignment completion. These three dimensions are interrelated and influenced by teacher-student interaction patterns. Therefore, pedagogical interaction plays a strategic role in maintaining comprehensive learning engagement.

Less adaptive interaction patterns can lead to a gradual decline in learning engagement. A lack of direct feedback can make students feel less cared for. This situation has the potential to reduce their sense of responsibility and active participation. Conversely, interactions designed in a communicative and participatory manner can encourage higher learning engagement. Teachers who actively build two-way communication can create an inclusive learning environment. The use of interactive features in digital platforms can strengthen student engagement. Thus, the quality of interactions is a determining factor in the success of digital learning.

Although digital learning has been widely implemented, research on changes in teacher-student interaction patterns still shows a research gap. Many studies focus on the effectiveness of technology or student academic achievement. The relational aspect of learning often receives insufficient attention. Yet, pedagogical interaction serves as a link between technology and students' learning experiences. Without a comprehensive understanding of interaction, technology utilization risks being suboptimal. Research linking interaction to motivation and learning engagement is still relatively limited. This situation indicates the need for a more integrative approach.

Based on this description, an in-depth analysis of changes in teacher-student interaction patterns is highly relevant. Digital learning cannot be separated from the dynamics of the pedagogical relationships formed within it. A comprehensive understanding can provide insight into the factors influencing student motivation and learning engagement. The study's findings are expected to provide theoretical contributions to the development of educational science. Furthermore, research findings can form the basis for more humanistic and effective digital learning practices. Teachers and educational institutions can utilize the research findings as a reference for policymaking. Thus, digital learning can be developed sustainably and oriented toward the quality of learning interactions.

METHOD

This study uses a qualitative approach with a literature review method to examine changes in teacher-student interaction patterns in digital learning and their implications for motivation and learning engagement. The research data are sourced from scientific articles published in accredited national journals and reputable international journals obtained through academic databases such as Google Scholar, Scopus, and DOAJ. The analyzed literature was selected based on the criteria of topic relevance, methodological clarity, and publication span over the past ten years. The data collection process was carried out through keyword searches related to pedagogical interaction, digital learning, learning motivation, and learning engagement. The selected articles were read critically to identify the study's focus and main findings. Data analysis was conducted using qualitative thematic analysis by grouping literature findings into interrelated conceptual themes. The results of the analysis were synthesized narratively to build a comprehensive understanding of the dynamics of teacher-student interactions and their influence on motivation and learning engagement in digital learning.

Results And Discussion

1. Changes in Teacher-Student Interaction Patterns in Digital Learning

Digital learning is driving a significant shift in interaction patterns between teachers and students. Previously direct and simultaneous interactions are shifting to technology-mediated communication. Digital media is shaping a more planned and platform-based communication structure. This pattern influences the frequency, duration, and form of pedagogical message exchange. Teachers no longer rely solely on face-to-face verbal communication. Messages are increasingly conveyed through text, visuals, and audiovisual recordings. This shift marks a fundamental transformation in pedagogical practice.

Changes in the form of interaction also affect the quality of the pedagogical relationship that is built. Emotional closeness between teachers and students is redefined as physical contact decreases. Pedagogical relationships are built more through consistent communication and clear instructions. Teacher responses to questions or assignments are a key indicator of pedagogical presence. The timeliness of feedback has a significant impact on student perceptions (Ningsih et al., 2025; Riswan et al., 2025). Delayed interactions have the potential to reduce the sense of connectedness. This condition shows that the quality of interaction is not solely determined by intensity, but also by responsiveness.

The structure of digital learning also influences the direction of communication. Many learning platforms facilitate one-way communication focused on delivering content. Interactive discussions require specific design to avoid being reduced to administrative activities. Teachers play a crucial role in creating spaces for meaningful dialogue. Adaptive communication strategies are essential in digital learning. Without them, interactions tend

to be mechanical. This situation highlights the importance of digital pedagogical competence in maintaining the quality of interactions.

Variations in interaction patterns also emerge based on the level of technological and pedagogical readiness. Teachers with adequate digital literacy tend to build more dynamic communication. Utilizing interactive features can enrich students' learning experiences. Students demonstrate more active responses when interactions are designed in a participatory manner. Conversely, limited digital competency can potentially limit interaction space. Communication patterns become rigid and less responsive. This variation demonstrates that technology is a facilitator, not a sole determinant.

Literature findings indicate that changing interaction patterns is a continuous adaptive process. Teachers and students both undergo a process of adjustment to the digital learning environment. Pedagogical interactions evolve through experience and reflection on learning practices. This process shapes new communication patterns unique to digital learning. Successful adaptation is heavily influenced by institutional support and educational policies. Digital pedagogy training is a key supporting factor. Thus, changing interaction patterns is an integral part of digital educational transformation.

2. Implications of Changes in Interaction on Student Learning Motivation

Student learning motivation is closely linked to the quality of pedagogical interactions. Supportive interactions can strengthen the internal drive to learn. Digital learning changes how students perceive teacher support. Limited communication can significantly impact these perceptions. Intrinsic motivation tends to decline when students feel under-appreciated. Conversely, consistent interactions can maintain enthusiasm for learning. This suggests that learning motivation is influenced by the established pedagogical relationships.

The increased learning autonomy in digital learning has a dual impact on motivation. Some students respond positively to the flexibility provided. Freedom to manage time and learning strategies can foster a sense of responsibility. A sense of ownership over the learning process contributes to intrinsic motivation. However, not all students are sufficiently prepared for independent learning. A lack of direction can lead to confusion and learning fatigue. This situation highlights the importance of balancing autonomy and mentoring.

The teacher's role in maintaining learning motivation has undergone significant adjustments. Teachers function not only as transmitters of material but also as motivational reinforcers. Constructive feedback is an important tool in building motivation. Recognition of student effort fosters a sense of competence. Personal interactions help maintain student emotional engagement. Learning motivation develops when students feel valued. The literature shows that pedagogical communication has a strong psychological impact (Scherer et al., 2021).

Limited social interaction also impacts affective motivation. Digital learning has the potential to diminish the sense of community in the classroom. Feelings of isolation can arise

when interactions are individualistic. Social motivation, typically fostered through group interactions, is weakened. Teachers need to create collaborative activities to maintain the social dimension of learning. Online discussions and virtual group work can be an alternative. This approach helps maintain a balance between cognitive and affective aspects. Therefore, learning motivation requires the support of multidimensional interactions.

A literature synthesis shows that learning motivation in digital learning is dynamic. Pedagogical interaction factors act as triggers and reinforcers of motivation. Variations in student responses are influenced by individual characteristics and the learning environment. Adaptive interactions can accommodate these differences. Teachers play a strategic role in managing motivational dynamics. Reflective communication design is key to success. These findings confirm that learning motivation is inextricably linked to the quality of teacher-student interactions.

3. The Influence of Interaction Patterns on Student Learning Engagement

Student learning engagement is a crucial indicator of successful digital learning. Changing interaction patterns influence how this engagement manifests. Engagement is no longer solely visible through physical presence. Online activities have become the primary means of student participation. Responses to digital materials reflect cognitive engagement. Interest and enthusiasm are reflected through emotional interactions. The behavioral dimension is evident in the consistency of task completion.

Pedagogical interactions act as triggers for learning engagement. Two-way communication encourages active student participation. Open-ended questions and reflective discussions enhance cognitive engagement. Clear feedback reinforces student understanding. Emotional engagement develops when students feel supported. The teacher serves as both a director and a facilitator of participation. Literature shows that engagement increases through meaningful interactions (Sinaga, 2024; Zhang & Lin, 2023).

Digital learning demands a redefinition of indicators of learning engagement. Passive participation does not necessarily reflect low engagement. Asynchronous activities enable engagement that is not immediately visible. Engagement analysis needs to consider the digital footprint of student activity. Written interactions have equal pedagogical value to verbal interactions. Teachers need to understand the variety of forms of engagement. Adaptive evaluation approaches are essential. Thus, learning engagement encompasses a broad spectrum.

The quality of interactions also influences the sustainability of learning engagement. Monotonous interactions can potentially diminish student interest. A variety of communication strategies helps maintain attention and focus. Integrating interactive media enriches the learning experience. Engagement increases when learning is contextually designed and relevant. Teachers need to continuously reflect on interaction practices. This

process supports student-centered learning. The literature emphasizes the importance of pedagogical innovation in maintaining engagement.

A synthesis of findings indicates that learning engagement is influenced by a combination of pedagogical and technological factors. Teacher-student interaction serves as the primary link between technology and the learning experience. Optimal engagement is achieved through adaptive and reflective communication. Teachers play a central role in managing these dynamics. Effective digital learning demands attention to the relational dimension. Without meaningful interactions, engagement can potentially decline. Therefore, strengthening interaction patterns is a key strategy for improving the quality of digital learning.

CONCLUSION

The conclusion of this study shows that digital learning brings fundamental changes to teacher-student interaction patterns that directly impact the dynamics of the learning process. Technology-mediated pedagogical interactions alter the form of communication, relational closeness, and the teacher's role in managing learning. The quality of interactions is determined not only by the frequency of communication but also by the responsiveness and clarity of feedback provided by teachers. These changes in interaction patterns significantly influence student learning motivation, both intrinsically and affectively. Learning motivation develops when students experience consistent and meaningful pedagogical support. The flexibility of digital learning can increase learning autonomy, but requires appropriate guidance to avoid diminishing learning enthusiasm. Student learning engagement also shifts in form along with changes in media and learning spaces. Cognitive, emotional, and behavioral engagement are key indicators of student participation in digital learning. Teacher-student interactions serve as a link between technology use and students' learning experiences. Without adaptive and reflective interactions, technology utilization has the potential to lose its pedagogical value. Teachers have a strategic role in designing participatory and inclusive learning communications. Therefore, strengthening the quality of pedagogical interactions is key to increasing motivation and learning engagement in digital learning.

Bibliography

Akpen, C. N., Asaolu, S., Atobatele, S., & Okagbue, H. (2024). *Impact of online learning on student's performance and engagement: systematic review*. Discover Education, 3(1), 1–15. doi: 10.1007/s44217-024-00253-0

Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2020). Mapping research in student engagement and educational technology in higher education: A

systematic evidence map. *International Journal of Educational Technology in Higher Education,* *17*(2), 1–30. https://doi.org/10.1186/s41239-019-0176-8

Deng, R., Benckendorff, P., & Gannaway, D. (2020). Learner engagement in MOOCs: Scale development and validation. *British Journal of Educational Technology, 51*(1), 245–262. https://doi.org/10.1111/bjet.12810

Deng, Z., & Yang, Z. (2025). *Exploring the impact of online education on student engagement in higher education in post-COVID-19: what students want to get?* Frontiers in Psychology, 16:1574886. doi: 10.3389/fpsyg.2025.1574886

Fanazal Risqianto, M. Hanif & M. Fadlullah. (2025). *Perubahan motivasi belajar di era pembelajaran digital dan pengaruhnya terhadap minat akademik siswa*. Jurnal Media Akademik (JMA), 3(12). doi: 10.62281/hrnxmh53

Farazwati, A., Hariandi, A., & Risdalina, R. (2025). *Keterlibatan siswa pada pembelajaran berbasis platform pembelajaran digital di sekolah dasar*. Pedagogik Journal of Islamic Elementary School. doi: 10.24256/pijies.v8i3.8777

Kahu, E. R., Picton, C., & Nelson, K. (2020). Pathways to engagement: A longitudinal study of the first-year student experience. *Higher Education, 79*(4), 657–673. https://doi.org/10.1007/s10734-019-00429-y

Levin, S. M. (2024). *Review on the influence of student engagement and interaction in online learning communities on academic achievement*. Journal of Wellbeing Technologies, 52(2). doi: 10.18799/26584956/2024/2/1823

Martin, F., Wang, C., & Sadaf, A. (2020). Student perception of helpfulness of facilitation strategies that enhance instructor presence, connectedness, engagement and learning in online courses. *Internet and Higher Education, 37*, 52–65. https://doi.org/10.1016/j.iheduc.2018.01.003

Ningsih, Y., Alwi, N. A., Rahmadani, A. S., Wagira, E., & Mutiara, Q. (2025). *Keterkaitan media pembelajaran digital dalam meningkatkan motivasi dan hasil belajar siswa kelas IV SD*. Jurnal Nakula : Pusat Ilmu Pendidikan, Bahasa dan Ilmu Sosial, 3(3), 295–301. doi: 10.61132/nakula.v3i3.1836

Risnawati, R., Pratama, B., & Rizqa, M. (2024). *Pengaruh kemampuan interaksi guru dalam pembelajaran terhadap motivasi belajar siswa*. Innovative: Journal Of Social Science Research, 4(2), 2377–2387. doi: 10.31004/innovative.v4i2.9710

Riswan, D., Rohmadi, S. H., & Suhardi, M. (2025). *Peningkatan keterlibatan siswa dalam digitalisasi pembelajaran di SMA Negeri 1 Wera*. Educator: Jurnal Inovasi Tenaga Pendidik dan Kependidikan. doi: 10.51878/educator.v4i3.3840

Roul, R., & Mohalik, R. (2025). *Student learning engagement in digital platforms: A literature review*. i-manager's Journal of Educational Technology, 21(4), 26–36. doi: 10.26634/jet.21.4.21372

Scherer, R., Howard, S. K., Tondeur, J., & Siddiq, F. (2021). Profiling teachers' readiness for online teaching and learning in higher education: Who's ready? *Computers in Human Behavior, 118*, 106675. https://doi.org/10.1016/j.chb.2020.106675

Sinaga, D. (2024). *Teacher-Student Interaction Models: Effective Strategies for Increasing Student Participation and Motivation*. Jurnal Teknologi Pendidikan, 26(3), 1052–1066. doi: 10.21009/jtp.v26i3.50372

Sun, J. C.-Y., & Rueda, R. (2021). Situational interest, computer self-efficacy and self-regulation: Their impact on student engagement in distance education. *British Journal of Educational Technology, 52*(4), 1521–1539. https://doi.org/10.1111/bjet.13089

Xu, Z., Yang, J., Zhang, H., & Liu, T. (2025). *The impact of teachers' teaching strategies on students' deep learning in online learning environments: the mediating role of learning interaction*. Frontiers in Education, 10:1680937. doi: 10.3389/feduc.2025.1680937

Zhang, Y., & Lin, C.-H. (2023). Teacher–student interaction and student engagement in online learning: A meta-analysis. *Educational Research Review, 39*, 100516.

Zhao, L., & McDougall, D. (2021). Interaction patterns and learning outcomes in synchronous online classrooms. *Computers & Education, 163*, 104118. https://doi.org/10.1016/j.compedu.2020.104118