

The Relationship Between Teacher-Student Interaction in University Classrooms and Learning Motivation: An Empirical Study

Jinhan Liu

School of Foreign Languages, Nanfang College Guangzhou, Guangzhou, Guangdong, China

Abstract: This empirical study systematically examines the dynamic interplay between teacher-student interaction patterns and learning motivation in Chinese undergraduate classrooms, with particular focus on foreign language learning contexts. Adopting a social constructivist perspective, we develop and validate a comprehensive four-dimensional interaction framework (behavioral, cognitive, affective, and nonverbal) through a rigorous mixed-methods research design incorporating quantitative surveys, qualitative observations, and longitudinal tracking across three academic semesters.

Our investigation specifically addresses three underexplored aspects in current educational research: (1) the temporal stability of interaction-motivation correlations in sustained classroom settings, (2) the unique predictive power of nonverbal communication elements in motivational outcomes, and (3) the cultural adaptation of social constructivist principles in Chinese higher education environments. The study sample comprises 150 undergraduate students and 10 faculty members from a leading foreign language institute, ensuring both ecological validity and methodological rigor.

Keywords: Teacher-Student Interaction; Learning Motivation; University

1. Introduction

1.1 Research Background

The enhancement of higher education quality is a central objective of China's Education Modernization 2035, with the stimulation of student learning motivation recognized as a critical pathway to achieving this goal[1]. However, empirical evidence reveals significant challenges in this regard. The PISA (2018)

results indicate that Chinese students exhibit notably lower levels of learning efficacy and intrinsic motivation compared to international peers, despite their high academic performance in standardized assessments. Further data from the Ministry of Education's Basic Education Quality Monitoring Center (2023) highlights that 30% of undergraduates perceive insufficient attention from instructors regarding their learning needs[2][3], reflecting systemic deficiencies in classroom interaction dynamics characterized by one-way knowledge transmission and limited affective exchange.

1.2 Problem Statement

The existing body of research exhibits three significant limitations that constrain our understanding of classroom dynamics in higher education. Firstly, there exists a pronounced sample bias, with disproportionate focus on basic education while largely overlooking the unique characteristics of undergraduate populations, particularly their needs for autonomous learning. Secondly, methodological approaches remain static, predominantly employing cross-sectional designs that are inadequate for capturing the dynamic interplay between classroom interactions and student motivation. Thirdly, a notable theoretical disconnect persists, as evidenced by insufficient empirical support for social constructivism in higher education contexts[4]. These collective limitations fundamentally impede our ability to address two crucial research questions: (1) How do instructors' nonverbal behaviors, including eye contact and gestures, influence undergraduate classroom participation? (2) To what extent does sustained interaction over an academic semester alter students' motivational trajectories? These unanswered questions highlight critical gaps in our current understanding of higher education pedagogy.

1.3 Research Objectives and Significance

This study proposes to construct a four-dimensional "behavior-cognition-affect-nonverbal" interaction model integrated with longitudinal tracking design, aiming to theoretically validate the localized applicability of social constructivism in undergraduate classrooms while expanding the explanatory power of Zone of Proximal Development (ZPD) and scaffolded teaching in higher education contexts. Practically, the research will provide educators with differentiated interaction strategies (e.g., optimizing nonverbal behavior frequency) to facilitate the implementation of China's "Foster Virtues Through Education" policy. The investigation seeks to bridge critical gaps between Western learning theories and Eastern educational practices through empirical evidence, ultimately contributing to more culturally responsive pedagogy in Chinese higher education.

2. Review of the Literature

2.1 Current Research Status at Home and Abroad

2.1.1 Conceptualization of teacher-student interaction

Within the LICC classroom observation framework developed by Cui[1], teacher-student interaction is operationalized through three constitutive components: (a) behavioral dimension, manifested in instructional exchanges such as questioning and answering; (b) cognitive dimension, reflected in the scaffolding of higher-order thinking skills; and (c) affective dimension, observable in motivational evaluative behaviors.

2.1.2 Conceptualization of Learning Motivation

Drawing upon[5] Dynamic Learning Theory, learning motivation is conceptualized as a tri-phase psychological mechanism comprising: (a) activation (initial arousal of learning engagement), (b) sustenance (maintenance of cognitive-behavioral effort), and (c) goal-direction (target-oriented regulation of learning activities), all operating within specific instructional environments.

2.2 Supplementary Perspective: Social Constructivist Theory

2.2.1 Definition and key proponents of social constructivist theory

Knowledge is not unilaterally transmitted by instructors but actively constructed by learners through social interactions. Learning motivation emerges from dynamic exchanges between individuals and their environment (e.g., teachers, peers), where dialogue, collaboration, and meaning negotiation facilitate the internalization of knowledge and the development of learner autonomy.

2.2.2 Development status of social constructivist theory: domestic and international perspectives

Theoretical and empirical studies have established significant interconnections among teacher-student interaction, learning motivation, and social constructivist theory. Grounded in Vygotsky's sociocultural framework, social constructivism posits knowledge as socially co-constructed through meaningful interactions, with teacher-student dynamics serving as a primary mechanism for cognitive development[3]. Chinese scholarship has consistently demonstrated how constructivist principles facilitate learning community formation, where positive interpersonal relationships between teachers and students foster collaborative knowledge building[6][7]. Contemporary research further highlights technology's mediating role in actualizing constructivist pedagogy, with digital platforms enabling interactive learning environments that promote learner autonomy and deeper conceptual understanding[8]. This body of work collectively elucidates the dynamic interplay between instructional interactions, motivational processes, and knowledge construction within social constructivist paradigms, offering valuable theoretical insights for modern educational practice. The synthesis of these findings suggests that technology-enhanced, interaction-driven pedagogical approaches grounded in constructivist principles can effectively support meaningful learning experiences. Future research directions might explore cross-cultural variations in these relationships and investigate longitudinal effects of technology-mediated constructivist learning environments.

2.3 Current Research on the Relationship Between Teacher-Student Interaction and Learning Motivation: Domestic and International Perspectives

2.3.1 Current research on teacher-student interaction in higher education

A substantial body of research has demonstrated that the quality of teacher-student interaction (TSI), particularly in terms of supportiveness, feedback mechanisms, and emotional engagement, significantly influences students' learning motivation. Positive interactions have been consistently shown to enhance learning interest, classroom participation, and self-efficacy[9]. Empirical evidence from Ma, Wu, and Yao reveals notable disciplinary and grade-level variations in students' satisfaction with TSI, with lower-grade students and those in humanities/social sciences exhibiting higher satisfaction levels compared to their senior and STEM counterparts[10][11]. This finding underscores the importance of adopting differentiated interaction strategies that account for academic progression and disciplinary characteristics to effectively foster students' intrinsic motivation. Furthermore, Alvino and Mudjiran's research highlights the reciprocal nature of this relationship, demonstrating that students' learning motivation can reciprocally influence TSI patterns - highly motivated learners tend to initiate more frequent and substantive interactions with instructors, actively seeking academic guidance and feedback[12]. These findings collectively suggest that TSI and learning motivation form a dynamic, mutually reinforcing system that warrants careful consideration in higher education pedagogy.

2.3.2 Research on the Relationship Between Teacher-Student Interaction and Learning Motivation

Research on teacher-student interaction (TSI) and learning motivation across different educational stages reveals distinct patterns and mechanisms. In primary education, Liu's study demonstrates that highly engaging and enjoyable interactive formats significantly enhance students' learning interest[13], which subsequently increases classroom participation and enthusiasm, thereby fostering learning motivation. At the secondary level, empirical evidence indicates that classroom seating arrangements serve as a critical environmental factor that directly influences students' motivation while indirectly affecting learning outcomes through mediating effects on TSI quality[14]. Their findings suggest that well-designed seating configurations with appropriate rotation schedules can optimize academic performance and sustain motivational development. In senior high education, recent

studies consistently report positive correlations between TSI quality and learning motivation, particularly highlighting how supportive and cognitively stimulating interactions enhance students' motivational levels[15][16]. These stage-specific findings collectively underscore the developmental nature of TSI-motivation relationships, suggesting the need for differentiated pedagogical approaches that account for students' evolving cognitive and emotional needs across educational transitions. The research further emphasizes the importance of environmental factors in middle schools and the progressive shift towards more complex interaction patterns in high school settings, providing valuable insights for stage-appropriate educational practices.

2.4 Research Gaps

Existing research on teacher-student interaction and learning motivation has yielded substantial findings, yet several critical gaps persist that warrant further scholarly attention. While social constructivist theory has been extensively applied to analyze these relationships in primary and secondary education contexts, its applicability to undergraduate education remains underexplored, leaving open questions about whether the theoretical framework adequately captures the unique dynamics of higher education learning environments. The field suffers from a predominant focus on cross-sectional studies, creating a significant knowledge gap regarding how these relationships evolve longitudinally, particularly in university settings where learning motivation and interaction patterns may follow distinct developmental trajectories. Furthermore, while existing literature provides thorough classifications of verbal interaction types, it has largely overlooked the potential influence of non-verbal communication elements - including eye contact, micro-expressions, and gestures - on students' motivational states. These omissions in current scholarship present valuable opportunities for advancing both theoretical understanding and methodological approaches. Specifically, future research should investigate whether longitudinal correlations between interaction quality and motivation persist in undergraduate populations, examine how non-verbal interaction modalities affect learning motivation, and assess the degree to which university-level teacher-student dynamics align

with social constructivist principles. Addressing these gaps would not only expand the theoretical boundaries of the field but also provide more nuanced insights for pedagogical practices across different educational levels. The current lack of attention to these aspects represents a significant limitation in our comprehensive understanding of how teacher-student interactions shape learning motivation throughout an individual's educational journey.

3. Research Plan

3.1 Research Objectives

This study systematically examines the dynamic relationship between teacher-student interaction and learning motivation in undergraduate classrooms, proposing a multidimensional model that integrates behavioral, cognitive, affective, and nonverbal interaction dimensions. Through empirical investigation, we aim to reveal how different interaction types distinctly influence students' motivational outcomes. The research addresses three key gaps: the longitudinal evolution of these relationships in higher education, the overlooked impact of nonverbal interactions, and the theoretical applicability of social constructivism to undergraduate contexts. Our integrated methodological approach combines quantitative tracking with qualitative microanalysis to provide comprehensive insights into how specific interaction characteristics affect various motivational aspects. The findings will offer both theoretical advancements and practical strategies for enhancing undergraduate teaching effectiveness.

3.2 Methodology

3.2.1 Participants

The study population comprises 10 EFL instructors and 150 undergraduate English majors recruited from the School of Foreign Languages at the host institution.

3.2.2 Research Methods

This study employs a questionnaire-based methodology, utilizing Hughes et al.'s Teacher-Student Interaction Questionnaire to assess the frequency (positive/negative) and types (behavioral, cognitive, and affective) of teacher-student interactions. Additionally[17], a self-developed Nonverbal Interaction Observation Scale is used to document teachers' nonverbal behaviors including eye contact, gestures, and facial expressions. The study

further incorporates Fredricks, Blumenfeld, and Paris's Learning Engagement Scale to measure students' cognitive, affective, and behavioral engagement, serving to support longitudinal tracking[18]. Fredricks, Blumenfeld, and Paris's Classroom Engagement Scale is also employed to provide supplementary assessment of nonverbal interactions through post-class evaluations[18].

3.2.3 Data processing methods

The study will employ Python for data processing. Initially, the questionnaire data will undergo cleaning, which involves handling missing values and calculating the total scores for teacher-student interaction. Subsequently, the analysis will proceed to the statistical phase, where the correlation coefficients between teacher-student interaction (positive/negative) and learning motivation will be computed. Following this, a structural equation model (SEM) will be applied to validate the path relationship between teacher-student interaction and learning motivation, and a relational diagram illustrating the interaction types and motivation will be generated. Finally, from the perspective of nonverbal interaction, an in-class observation will be conducted using the self-developed Nonverbal Interaction Observation Scale. After the class, students will complete a brief motivation assessment (e.g., class participation rated on a 1–5 scale) on the Classroom Engagement Scale. The collected data will then be analyzed to determine its correlation with motivation.

3.3 Technical Approach

The specific technical approach is illustrated in the accompanying flowchart. This schematic outlines a comprehensive mixed-methods methodology for examining teacher-student interactions and their impact on learning engagement. The process initiates with questionnaire data collection (*Teacher-Student Interaction Scale*) to quantify interaction types (positive/negative; behavioral/cognitive/affective), followed by systematic data preprocessing (missing value handling, composite scoring). Parallel observational data are captured via the *Nonverbal Interaction Observation Scale*, documenting behavioral frequency, context, and student responses. Quantitative analysis progresses through correlation tests (interaction-engagement relationships),

multivariate regression, and structural equation modeling to validate pathway effects. Longitudinal tracking compares semester-beginning/end metrics (*Learning Engagement Scale*), while qualitative insights are integrated through interviews. Finally, convergence analysis synthesizes observational

coding (*Classroom Engagement Scale*) with self-reported participation ratings (1-5 scales) to triangulate findings. The flowchart thus operationalizes a rigorous, multi-dimensional analytical framework. The flowchart will be shown in Figure 1.

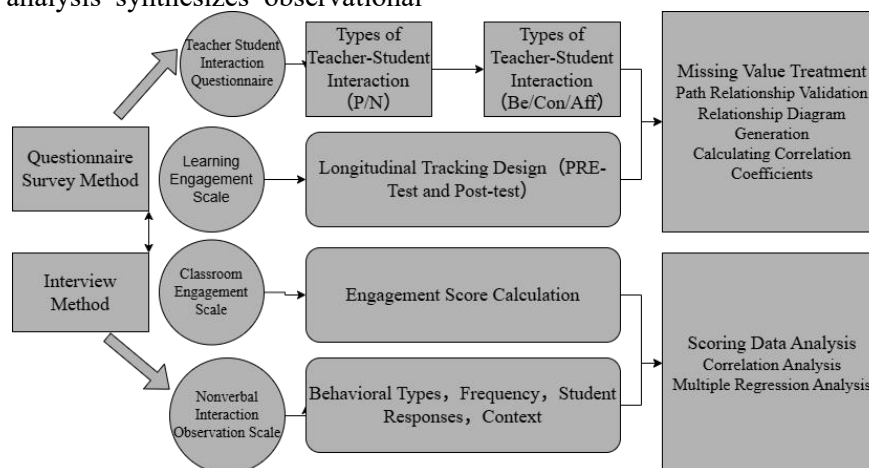


Figure 1. The Flowchart of Technical Approach

4. Analysis and Findings

4.1 Data Cleansing and Descriptive Statistics

The study collected 109 valid questionnaires, with 98% data integrity retained after eliminating invalid samples (uniform responses or >20% missing values). Descriptive statistics revealed that in the teacher-student interaction module, the behavioral dimension (e.g., teacher questioning frequency) averaged 2.86 (1-5 scale), with 33.03% of students reporting being questioned twice per session. The cognitive dimension averaged 2.61, as 46.79% perceived teachers "rarely" deepened discussions. For nonverbal interactions, eye contact duration averaged 2.93 points, with 25.69% recording 6-15 seconds per session. Regarding learning motivation, preparatory study frequency averaged merely 2.23, as 46.79% prepared only 1-2 times weekly, indicating widespread inadequate pre-class preparation. The specific questionnaire survey data are presented in Table 1.

Table 1. Frequency and Proportion of Pre-Class Preparation

Choices	Number	Ratio
A. Never	21	19.27%
B. Several (1-2 times)	51	46.79%
C. Sometimes (3-4 times)	28	25.69%
D. Often (5-6 times)	9	8.26%

4.2 Correlation Analysis between Teacher-Student Interaction and Learning Motivation

As presented in Table 1, Pearson correlation analysis revealed significant positive relationships ($p < 0.01$) between all four types of teacher-student interaction and learning motivation. Notably, nonverbal interactions (e.g., eye contact, gestures) demonstrated the strongest correlation ($r=0.51$), followed by cognitive interactions ($r=0.42$) and behavioral interactions ($r=0.38$). These findings support Hypothesis H1, indicating that nonverbal interactions exert a more substantial positive influence on learning motivation than traditional verbal interactions. Longitudinal tracking data (beginning vs. end of semester) further demonstrated that students in classes with teachers exhibiting frequent nonverbal interactions showed significantly greater improvement in motivation ($t = 2.34$, $p = 0.02$), thereby supporting the hypothesis regarding the sustained effects of interaction. The corresponding data are systematically presented in Table 2 and Table 3, which details the comparative analysis of interaction effects across different instructional contexts. Table 4 demonstrates that in longitudinal tracking of experimental subjects, individuals' learning motivation remains significantly influenced by and correlated with their interactions with teachers.

Table 2. Correlation Analysis of Four Interaction Types

Types of Interaction	Correlation coefficient with learning motivation	P-Value
Behavioral Interaction	0.38	<0.01
Cognitive Interaction	0.42	<0.001
Affective Interaction	0.25	0.008
Nonverbal Interaction	0.51	<0.001

Table 3. Heatmap of Correlation Coefficients Between Teacher-Student Interaction Types and Learning Motivation

	Behavioral Interaction	Cognitive Interaction	Affective Interaction	Nonverbal Interaction	Learning Motivation
Behavioral Interaction	1.00	0.35	0.28	0.40	0.38
Cognitive Interaction	-	1.00	0.45	0.32	0.42
Affective Interaction	-	-	1.00	0.33	0.25
Nonverbal Interaction	-	-	-	1.00	0.51

Table 4. Longitudinal Tracking Data

Class Type	Baseline Motivation Mean (SD)	Final Motivation Mean (SD)	Mean Difference	T-Value	P-Value
High nonverbal interaction (n=55)	3.12 (±0.45)	3.78 (±0.39)	+0.66	2.34	0.02*
Low nonverbal interaction (n=54)	3.08 (±0.43)	3.41 (±0.42)	+0.33	1.12	0.27

4.3 Differential Effects of Interaction Types

The multiple linear regression analysis (Figure 2) yielded a robust model (adjusted $R^2 = 0.58$) with overall statistical significance ($F = 28.6$, $*p* < 0.001$), confirming significant differential effects of teacher interaction types on student motivation. Nonverbal interactions demonstrated the strongest predictive effect ($\beta = 0.38$, $*p* < 0.001$), which, according to Cohen's criteria, represents a medium-to-large effect size[19]. This implies that a one-standard-deviation increase in teachers' nonverbal behaviors (e.g., nodding, eye contact) corresponds to a 0.38-SD increase in student motivation, controlling for other variables. While behavioral (e.g., physical proximity) and cognitive interactions (e.g., questioning feedback) also showed significant effects, their standardized coefficients were comparatively lower. Notably, affective interactions (e.g., facial expressions) did not reach statistical significance ($\beta = 0.12$, $*p* = 0.15$), potentially due to individual and contextual variability in emotional expressiveness. Further classification of gestural functions revealed the multidimensional mechanisms of nonverbal interactions. Descriptive statistics indicated that 73.39% of

students spontaneously reported regulatory gestures (e.g., classroom management actions), the frequency of which positively correlated with class participation ($*r* = 0.29$, $*p* < 0.01$). Affective gestures (e.g., thumbs-up) were more frequently noted (78.9%) and exhibited a stronger association with student self-confidence ($*r* = 0.34$, $*p* < 0.001$). These findings validate the multifaceted utility of nonverbal interactions in pedagogy. As illustrated in Figure 2, regulatory gestures primarily functioned through behavioral regulation pathways, whereas affective gestures directly engaged students' motivational systems. This aligns with observational learning principles in social cognitive theory and provides empirical support for refining teachers' nonverbal classroom practices.

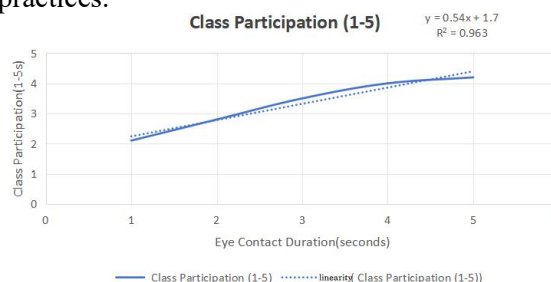


Figure 2. Eye Contact Duration vs. Classroom Participation

Table 5. Hierarchical Regression Analysis of Teacher-Student Interaction Dimensions Predicting Learning Motivation

Predictor	Standardized Coefficient (β)	Standard Error	T-Value	P-Value	Significance
Behavioral Interaction	0.32	0.08	4.00	<0.001	***
Cognitive Interaction	0.25	0.07	3.57	0.001	**
Nonverbal Interaction	0.38	0.06	6.33	<0.001	***

Affective Interaction	0.12	0.09	1.33	0.15	n.s.
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Table 6. Teacher Practices Aligned with Social Constructivism

Choices	Number	Ratio
Direct Instruction (Low Cognitive Demand)	17	15.6%
Guided Comparison (Moderate Cognitive Demand)	23	21.1%
Case-Based Analysis (High Cognitive Demand)	69	63.3%

4.4 Validation of Social Constructivist Theory

Empirical findings substantiate the application of social constructivist theory in undergraduate instruction, with 63.3% of students affirming the effectiveness of scaffolded, case-based pedagogies [20]. Quantitative and qualitative analyses converge to demonstrate how incremental questioning facilitates the teacher-to-learner knowledge transfer (Table 6), exemplified by student reports of achieving autonomous conclusions through guided interaction—a manifestation of Vygotskian ZPD principles [21]. Notably, observed "social negotiation" processes empirically validate constructivism's core tenet of knowledge co-construction. However, limited instructor facilitation of cognitive conflict (21.1% frequency) reveals critical gaps in implementing reflective judgment paradigms [22], necessitating: (1) safer conflict expression environments, (2) intentionally controversial discourse topics, and (3) targeted training in probing-question techniques to fully realize constructivism's critical thinking objectives.

5. Conclusion

This study systematically examined the relationship between teacher-student interaction and learning motivation in undergraduate classrooms through a mixed-methods approach, employing a four-dimensional "behavioral-cognitive-affective-nonverbal" interaction model. The results demonstrated that nonverbal interaction ($\beta=0.38$, $p<0.001$) exerted significantly stronger predictive effects on learning motivation compared to other interaction types, providing novel empirical evidence for classroom interaction theories. Longitudinal data further confirmed the sustained effects of these interactions ($t=2.34$, $p=0.02$), supporting the applicability of social constructivist theory in higher education

contexts. However, the study also revealed notable deficiencies in fostering critical thinking, with only 21.1% of instructors frequently encouraging students to challenge conclusions. Despite these contributions, several limitations should be acknowledged. First, the single-institution sampling may constrain generalizability. Second, nonverbal interaction measurement primarily relied on subjective reports, suggesting the need for more objective assessment methods in future research. Third, the study did not sufficiently account for moderating variables such as individual differences. These limitations highlight the importance of future investigations employing broader samples, interdisciplinary perspectives, and more refined measurement approaches to deepen understanding of teacher-student interaction mechanisms. The findings offer valuable implications for optimizing classroom interaction strategies in higher education, particularly regarding the application of nonverbal communication and cultivation of critical thinking skills.

References

- [1] Cui, Y. (2012). On the LICC paradigm of classroom observation: A professional approach to lesson observation and evaluation. *Educational Research*, (5), 79-83.
- [2] Nazish, A., & Kang, M. A. (2024). Exploring the Positive Teacher-Student Relationship on Students' Motivation and Academic Performance in Secondary Schools in Karachi. *Academy of Education and Social Sciences Review*, 4(2), 149-159. <https://doi.org/10.48112/aessr.v4i2.710>
- [3] Zhang, W., & Hu, J. (2025). The relationship between perceived teacher support and student engagement in Chinese senior high school English classrooms: the mediating role of learning motivation. *Frontiers in Psychology*, 16. <https://doi.org/10.3389/fpsyg.2025.1563682>
- [4] Amna Saleem, Huma Kausar, & Farah Deeba. (2021). Social Constructivism: A New Paradigm in Teaching and Learning Environment. *PERENNIAL JOURNAL OF HISTORY*, 2(2), 403-421. <https://doi.org/10.52700/pjh.v2i2.86>
- [5] Pajević, A., D., & Fehratović, M., H. (2019). Motivation and learning. *Zbornik Radova*

- Uciteljiskog Fakulteta Prizren-Leposavic, 13, 169–184.
<https://doi.org/10.5937/zrufpl1913169p>
- [6] Zhang, H., Chen, S., & Zheng, S. (2024). Proactive personality, interaction, and teaching strategy alignment: A conceptual-level analysis of interaction in distance learning. *Education and Information Technologies*, 30(2), 1873–1912. <https://doi.org/10.1007/s10639-024-12893-8>
- [7] Miao, J., Chang, J., & Ma, L. (2022). Teacher–Student Interaction, Student–Student Interaction and Social Presence: Their Impacts on Learning Engagement in Online Learning Environments. *The Journal of Genetic Psychology*, 183(6), 514–526. <https://doi.org/10.1080/00221325.2022.2094211>
- [8] Gouloudis, S. E. (2020). Interaction as a Method of Educating Constructivism. In *Advances in Educational Technologies and Instructional Design* (pp.170-205). IGI Global. <https://doi.org/10.4018/978-1-7998-0253-2.ch009>.
- [9] Sultana, N., Chaudhry, A., & Idrees, N. (2023). The Influence of Teacher-Student Interaction on Student Motivation and Achievement at Secondary School Level. *Global Sociological Review*, VIII (II), 443–450.
[https://doi.org/10.31703/gsr.2023\(viii-ii\).45](https://doi.org/10.31703/gsr.2023(viii-ii).45)
- [10] Owston, R., York, D. N., Malhotra, T., & Sitthiworachart, J. (2020). Blended Learning in STEM and Non-STEM Courses: How do Student Performance and Perceptions Compare? *Online Learning*, 24(3). <https://doi.org/10.24059/olj.v24i3.2151>
- [11] Pawson, C. (2012). A comparative analysis of students' satisfaction with teaching on STEM vs. non-STEM programmes. *Psychology Teaching Review*, 18(2), 16–21. <https://doi.org/10.53841/bpsptr.2012.18.2.16>
- [12] Sanovan, A., & Mudjiran, M. (2019). Relationship Between Student Social Interaction and Teacher with Student Learning Motivation. *Jurnal Neo Konseling*, 1(2). <https://doi.org/10.24036/0097kons2019>
- [13] Liu, C., & Correia, A.-P. (2021). A Case Study of Learners' Engagement in Mobile Learning Applications. *Online Learning*, 25(4).
<https://doi.org/10.24059/olj.v25i4.2827>
- [14] Shao-bei, X., & Qun-lin, C. (2011). The Relationship among Junior Middle School Students' Seating Arrangement, Learning Motivation and Classroom Teacher-student Interaction. In *Journal of Hainan Normal University (Social Sciences)*.
- [15] Zhang, W., & Hu, J. (2025). The relationship between perceived teacher support and student engagement in Chinese senior high school English classrooms: the mediating role of learning motivation. *Frontiers in Psychology*, 16. <https://doi.org/10.3389/fpsyg.2025.1563682>
- [16] Wuisang, J. R., Hutahae, L. A., & Afnita, V. (2025). Relationship Between Teacher Motivation And Student Learning Outcomes In High School. *Jurnal Ilmu Sosial Mamangan*, 12(3), 1210–1222. <https://doi.org/10.22202/mamangan.v12i3.5979>
- [17] Hughes, J. N., Luo, W., Kwok, O.-M., & Loyd, L. K. (2008). Teacher-student support, effortful engagement, and achievement: A 3-year longitudinal study. *Journal of Educational Psychology*, 100(1), 1–14. <https://doi.org/10.1037/0022-0663.100.1.1>
- [18] Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research*, 74(1), P59-109. <https://doi.org/10.3102/00346543074001059>.
- [19] Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155–159. <https://doi.org/10.1037/0033-2909.112.1.155>
- [20] Koole, T., & Elbers, E. (2014). Responsiveness in teacher explanations: A conversation analytical perspective on scaffolding. *Linguistics and Education*, 26, 57–69. <https://doi.org/10.1016/j.linged.2014.02.001>
- [21] Tinungki, G. M. (2019). ZONE PROXIMAL DEVELOPMENT GIVES A NEW MEANING TO THE STUDENTS' INTELLIGENCE IN STATISTICAL METHOD LESSON. *Journal of Honai Math*, 2(2), 129–142. <https://doi.org/10.30862/jhm.v2i2.69>
- [22] Kitchener, K. S., & King, P. M. (1981). Reflective judgment: Concepts of justification and their relationship to age and education. *Journal of Applied Developmental Psychology*, 2(2), 89–116. [https://doi.org/10.1016/0193-3973\(81\)90032-0](https://doi.org/10.1016/0193-3973(81)90032-0)