

Correlation of Teacher Interpersonal Interaction and Classroom Emotional Climate in Biology Learning, Merdeka Curriculum

Savira Nuraini¹, Zulfiani^{2*}

^{1,2}Department of Biology Education, Faculty of Tarbiyah and Teacher Training, UIN Syarif Hidayatullah Jakarta, Tangerang Selatan, Indonesia

*Corresponding author: zulfiani@uinjkt.ac.id

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Abstract: In recent years, Indonesia's national curriculum has shifted from the 2013 Curriculum to the Merdeka Curriculum, requiring adjustments in the learning process. A key factor in implementing this curriculum successfully is the interaction between teachers and students, especially in Biology. This subject demands effective communication and strong teacher-student relationships. The Merdeka Curriculum features student-centered learning, flexibility, and character development elements that require teachers to demonstrate empathetic and communicative interpersonal skills. This study aims to analyze the relationship between teacher interpersonal interaction and the emotional climate of the classroom in Biology learning under the Merdeka Curriculum. The research employed a quantitative correlational method with a sample of 41 eleventh-grade science students from public high schools in West Bogor City. Data were collected using the QTI (Questionnaire on Teacher Interaction) and Q-CEC (Questionnaire on Classroom Emotional Climate) and analyzed using the Pearson product-moment correlation with IBM SPSS Statistics version 26. The results showed a positive and significant relationship between teacher interpersonal interaction and the classroom emotional climate, contributing 14.9%. Interactions characterized by empathy, emotional support, and effective communication, especially from teachers with Tolerant and Authoritative profiles, help create a conducive classroom atmosphere that supports the learning process. These findings highlight that the quality of teacher interpersonal interaction is a key factor in fostering a positive emotional climate in Biology learning under the Merdeka Curriculum.

Keywords: Biology, Classroom Emotional Climate, Interpersonal Interaction, Merdeka Curriculum

1. INTRODUCTION

In recent years, the curriculum has transitioned from the 2013 Curriculum to the Merdeka Curriculum, bringing various adjustments to the learning process. This policy provides educators with greater flexibility to develop learning that is more creative, interactive, innovative, and relevant to real-life contexts ([Lembong et al., 2023](#)). These curriculum changes have inevitably impacted learning activities and student achievement ([Azahra, 2024](#)). According to [Nurwiati \(2022\)](#), negative consequences of the curriculum transition include challenges such as

declining student achievement, attributed to students' difficulties adapting to the new learning system. Furthermore, the curriculum shift significantly influences the roles and responsibilities of teachers within the educational process ([Maskur, 2023](#)).

The teaching and learning process involves communication between educators, who act as communicators, and students, who receive messages, facilitating the delivery of learning materials and the development of educational interactions ([Walewangko et al., 2024](#)). The teaching and learning interaction is a reciprocal

relationship between educators and students within a teaching system that has important factors in achieving the learning objectives that create positive changes in student learning outcomes ([Lubis, 2024](#)). Positive interactions and harmonious communication create a pleasant and effective learning environment ([Sulthon & Ikhsanuddin, 2024](#)).

According to Mulyana (in [Nandayarni et al., 2024](#)), interpersonal communication is face-to-face communication that enables direct responses, both verbal and nonverbal. This ability is essential for teachers to build emotional closeness and foster effective learning. Furthermore, [Asmara et al., \(2024\)](#) state that effective interpersonal interaction by teachers supports a pleasant learning atmosphere that successfully motivates students.

Classroom climate refers to the atmosphere within the classroom that influences students' emotional states and results from interactions between teachers and students ([Maing & Mahmud, 2022](#)). Previous research by Weber (in [Parhusip, 2021](#)) states that the interpersonal relationship between teachers and students is instrumental in creating a positive emotional climate in the classroom. A conducive learning environment fosters students' emotional intelligence and positively impacts their academic achievement ([Sudarmawan et al., 2024](#)).

Biology learning is a complex subject that requires students to develop knowledge and problem solving skills ([Sari & Ferry, 2024](#)). The successful implementation of this scientific process heavily depends on the teacher's role. One of the challenges in Biology learning arises from the teaching methods employed by the teacher. Monotonous and one-way instruction limits students' effective engagement in the learning process ([Karimah et al., 2024](#)).

Students' inactivity in learning results from limited opportunities to ask questions, rigid teaching styles, and passive learning habits ([Sareong & Supartini, 2020](#)). This study emphasizes that positive interpersonal relationships between teachers and their students play a vital role in enhancing learners' engagement in the classroom. Furthermore, [Putri et al., \(2020\)](#) found a positive correlation between teachers' interpersonal behavior and students' academic achievement.

The Merdeka Curriculum emphasizes student-centered learning, flexibility, and character development, which require teachers to demonstrate empathetic and communicative interpersonal skills ([Nurhayati et al., 2023](#)). These characteristics encourage the creation of a positive emotional classroom climate, thereby supporting students' active engagement in the learning process ([Saragih & Marpaung, 2022](#)). However, the practical application of this curriculum presents several challenges, such as teachers' limited understanding of inquiry-based learning tools and students' low problem-solving skills, which can hinder the comprehension of biological concepts. For example, a study by [Nuraini et al. \(2017\)](#) revealed that teachers struggled with designing instructional tools, while students experienced difficulties in solving problems within inquiry-based Biology learning. These findings suggest that the quality of interpersonal interactions between teachers and students, combined with the classroom's emotional climate, plays a crucial role in enhancing the effectiveness of Biology education within the Merdeka Curriculum.

Research by [Nurwiatin \(2022\)](#) shows that curriculum changes have negative impacts, such as declining student achievement due to difficulties adapting to the new system. Such findings emphasize the importance of the teacher's role in the learning process. However, Elmore and Sykes (in [Nurwiatin, 2022](#)) state that there is no guarantee that teachers can implement curriculum policies as expected. Therefore, a strong interpersonal relationship between teachers and students is crucial for the success of the learning process.

Based on the aforementioned explanation regarding studies on the relationship between interpersonal communication, classroom emotional climate, and curriculum changes in general, and specifically in Biology learning, evidence indicates that the interpersonal relationship between Biology teachers and students positively influences the biology learning process. Likewise, the emotional climate of the classroom has a positive impact on the learning experience. However, limited investigation has explored the correlation between teacher interpersonal interaction, classroom emotional climate, and its relevance to Biology learning

within the Merdeka Curriculum. Therefore, the researcher is interested in conducting a study entitled "Correlation of Teacher Interpersonal Interaction and Classroom Emotional Climate in Biology Learning under the Merdeka Curriculum". This study aims to act as a reflective tool for teachers to enhance their teaching practices and create a more effective and conducive learning environment, particularly in Biology instruction within the Merdeka Curriculum framework.

2. RESEARCH METHOD

This research is a quantitative study that uses a non-experimental ex post facto method with a correlational technique to analyze the relationship between two or more variables. In this study, the correlation between two variables, namely teacher interpersonal interaction (X) and classroom emotional climate (Y), will be examined based on students' perceptions of teachers through the questionnaires provided. This research was conducted at public high schools in West Bogor City in January 2025.

The instruments used in this study include the Questionnaire on Teacher Interaction (QTI), which measures students' perceptions of the teacher-student interpersonal relationship. According to [Maulana et al., \(2011\)](#), this instrument comprises the following indicators: leadership, helpful/friendly, understanding, student freedom, uncertain, dissatisfied, admonishing, and strict. Additionally, the Questionnaire on Classroom Emotional Climate (Q-CEC) was used to assess students' perceptions of the classroom emotional climate in the biology learning process under the Merdeka Curriculum. According to [Rahmawati et al., \(2023\)](#) the Q-CEC includes the following indicators: care, control, clarity, challenge, motivation, consolidation, collaboration, and attitude.

Both instruments consist of 8 indicators each. Based on the validity test results conducted on variable X, it was found that out of 48 questionnaire items, 7 questions were invalid, namely items number 10, 12, 20, 32, 41, 46, and 48. Meanwhile, the other 41 questions were declared valid. The item distribution for the teacher interpersonal interaction instrument is shown in Table 1 below.

Table 1. Item Distribution for Teacher Interpersonal Interaction Instrument

Indicator	Item Numbers
Leadership	1,5,9,13,17,21
Helpful/Friendly	25, 29, 33, 37, 41, 45
Understanding	2, 6, 10, 14, 18, 22
Student Freedom	26, 30, 34, 38, 42, 46
Uncertain	3*, 7*, 11*, 15, 19*, 23*
Dissatisfied	27*, 31*, 35*, 39*, 43*, 47*.
Admonishing	4*, 8*, 12*, 16*, 20, 24*.
Strict	28, 32*, 36*, 40, 44*, 48*.

*Negative Question

Source : ([Rahmawati et al., 2023](#))

Based on the validity test results conducted on the classroom emotional climate questionnaire, it was found that out of 50 questionnaire items, 13 questions were invalid, namely items number 8, 10, 13, 19, 22, 24, 25, 29, 31, 37, 39, 40, and 42. Meanwhile, the other 37 questions were declared valid. The item distribution for the classroom emotional climate instrument is shown in Table 2 below.

Table 2. Item Distribution for Classroom Emotional Climate Instrument

Indicator	Item Numbers
Care	1, 2, 3, 4, 5, 6.
Control	7, 8, 9, 10, 11
Clarity	12, 13, 14, 15, 16, 17
Challenge	18, 19, 20, 21, 22, 23
Motivation	24, 25, 26, 27, 28, 29
Consolidation	30, 31, 32, 33, 34, 35
Collaboration	36, 37, 38, 39, 40, 41.
Attitude	42, 43, 44, 45, 46, 47, 48, 49,50

Source : ([Rahmawati et al., 2023](#))

The population in this study consists of XI MIPA students from public high schools in West Bogor City, which includes 2 schools. The research sample consists of 41 students. *Purposive sampling* is the process of determining the sample based on specific considerations that were formulated in advance ([Sugiyono, 2021](#)). The sample used was selected based on schools that have implemented the Merdeka curriculum for three years. Data were analyzed using IBM SPSS Statistics version 26 by conducting hypothesis testing with correlation tests. The correlation test employed was the Pearson Product Moment, and the coefficient interpretation was used to determine the strength of the relationship between

variables. The interpretation of the correlation coefficient is shown in Table 3 below.

Table 3. Interpretation of Correlation Coefficient

Interval Value (+)	Strength of Relationship	Interval Value (-)
0,000 – 0,199	Very Weak	(-0,800) – (-1,000)
0,200 - 0,399	Weak/ Low	(-0,600) – (0, 799)
0,400 – 0,599	Moderate	(-0,400) – (-0,599)
0,600 – 0,799	High	(-0,200) – (-0,399)
0,800 – 1,000	Very High	(-0,000) – (-0,199)

Source : (Gunawan, 2015)

3. RESULTS AND DISCUSSION

The results of this study were obtained through the distribution of questionnaires measuring teacher interpersonal interaction and classroom emotional climate, filled out by 41 students who were the research sample. Based on the research conducted on students regarding interpersonal interaction and classroom emotional climate in Biology learning under the Merdeka curriculum, with a Likert scale-based questionnaire with a score interval of 1-5 on 78 items. Before conducting hypothesis testing, the data were first analyzed through data description using score categorization of the questionnaire regarding teacher interpersonal interaction and classroom emotional climate. The results of the data categorization of the questionnaire are shown in Tables 4 and 5 below.

Table 4. Categorization of Teacher Interpersonal Interaction Questionnaire Scores

School	Score	Average	Percentage (%)	Category
SMAN A	2265	125,83	61,38%	Moderate
SMAN B	2842	123,56	60,28%	Moderate
Total	5107	124,56	60,76%	Moderate

Based on Table 4, it is known that students' perceptions of teacher interpersonal interaction in Biology learning under the Merdeka curriculum at public high schools in West Bogor City have an average score of 124.56, indicating that this score falls into the moderate category with a percentage of 60.76%. The description of perceptions regarding teacher interpersonal interaction in Biology learning under the Merdeka curriculum can also be seen based on the indicators of the

questionnaire. The results of the questionnaire for each indicator are presented in Figure 1.

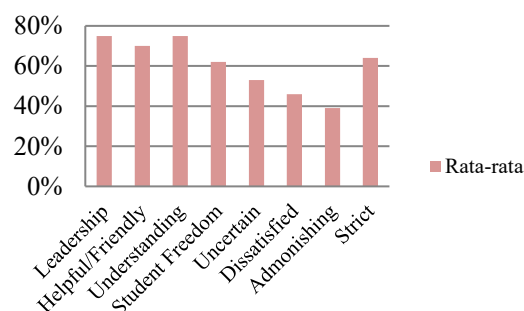


Figure 1. Teacher Interpersonal Interaction Questionnaire Diagram (QTI)

Figure 1 shows the results of the teacher-student interpersonal interaction questionnaire scores broken down into 8 indicators. The results in the graph show that the indicators for leadership and understanding have the highest scores with an average value of 75%, which falls into the moderate category, while the lowest score is held by the admonishing indicator with an average value of 39%, which falls into the low category. The highest average percentage obtained in the leadership and understanding indicators indicates the teacher's role in leading the class and attracting students' attention, as well as the teacher's role in showing concern or care for students during learning. This result is in line with research Putri *et al.*, (2020), which states that teachers with leadership, understanding, and friendly attitudes tend to be more favored by students. Meanwhile, the lowest average percentage obtained in the admonishing indicator shows that during class instruction, teachers have been able to control their emotions by not showing anger or impatience.

Based on the previous explanation of these three indicators, it can be understood that, on average, students feel the teacher's role in leading the class, attracting students' attention, and showing concern and care. Moreover, the teacher has successfully maintained composure and demonstrated patience with students during class instruction. These results indicate that the interpersonal communication between teachers and students during the learning process reflects a positive and constructive quality.

Differences in the average percentage results for each indicator in the QTI questionnaire may be

due to variations in students' perceptions of the interpersonal approach and teaching style implemented by the teacher. Previous learning experiences, expectations of the teaching teacher, and the social and emotional conditions created during the learning process in the classroom are some factors that influence the differences in student perceptions. Therefore, understanding the teacher's interpersonal profile typology is crucial for grasping the dynamics of interpersonal relationships in the classroom. The typology created in classroom learning illustrates the patterns of interaction and communication characteristics of the teacher during learning activities. Figure 2 illustrates the typology of the teacher's interpersonal profile in this study.

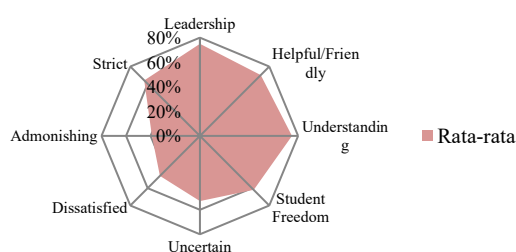


Figure 2. Diagram of Teacher Interpersonal Profile Typology

Based on the typology of interpersonal profiles shown in Figure 2, it is evident that Biology teachers at public high schools in West Bogor City fall into the Tolerant-Authoritative teacher type. This conclusion is drawn from the highest scores on the leadership and understanding indicators that characterize the tolerant type. However, the score for the strictness indicator, at 64%, indicates that teachers still maintain firmness and discipline in the classroom an important trait representing the authoritative type.

Teachers with an authoritative style are those who are firm yet supportive, authoritative yet empathetic, and capable of creating a positive and interactive learning environment. This finding is supported by research conducted by [Ghafarpour & Moinsadeh, \(2021\)](#), which demonstrates that teachers with an authoritative profile are preferred by students and are regarded as closest to the ideal teacher figure.

Table 5. Categorization of Classroom Emotional Climate Questionnaire Scores

School	Score	Average	Percentage (%)	Category
SMAN A	2581	143,39	77.51%	Moderate
SMAN B	2880	125,22	67.69%	Moderate
Total	5461	133,20	72%	Moderate

Based on Table 5, it is evident that students' perceptions of the emotional climate created between teachers and students in Biology learning under the Merdeka Curriculum at public high schools in West Bogor City have an average score of 133.20, indicating that this score falls within the moderate category, with a percentage of 72%. The description of these perceptions can also be examined based on the questionnaire indicators. The results for each indicator are presented in Figure 3.

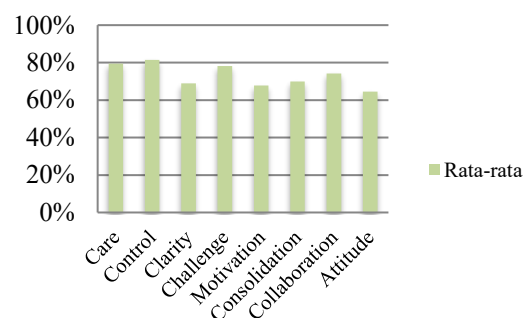


Figure 3. Classroom Emotional Climate Questionnaire Diagram (Q-CEC)

Figure 3 shows the results of the classroom emotional climate questionnaire scores broken down into 8 indicators. The results in the graph show that the control indicator has the highest score with an average value of 81%, which falls into the high category. Meanwhile, the lowest score is attributed to the attitude indicator, with an average value of 65%, placing it in the moderate category. The highest average percentage obtained in the control indicator indicates the significant role of the teacher in managing students during classroom learning. Next, the lowest average percentage held by the attitude indicator shows that during classroom learning, the teacher has not fully succeeded in creating a pleasant atmosphere in the learning process.

The previous explanation regarding these two indicators can be interpreted to suggest that, on average, students feel a significant role of the teacher in managing the classroom during the learning process. This result is in line with research conducted by [Ma et al., \(2023\)](#) which emphasizes the importance of the teacher's role in managing the classroom as a means of maintaining a positive emotional climate that will support effective and beneficial learning activities for students. However, teachers have not fully succeeded in creating a pleasant learning atmosphere in the classroom. According to [McLure et al., \(2022\)](#), several factors contribute to the low scores of the attitude indicator, such as a decline in perceptions of support and attention from the teacher, a lack of student involvement and motivation, and negative experiences during the learning process. This statement is reinforced by the results of research that have been conducted (see Figure 3), where the average score of the motivation indicator is the second lowest after the attitude indicator, with a percentage of 68%.

The results of the normality test using the Kolmogorov-Smirnov test show that the significance value for the teacher interpersonal interaction variable is 0.078 and the classroom emotional climate variable is 0.200, both of which show significant results > 0.05 . This indicates that both data variables are normally distributed. The results of the linearity test show a significance value for the Deviation from linearity of $0.354 > 0.05$. This indicates that there is a linear relationship between the two variables. Additionally, the calculated F value of $1.195 < \text{the F table value of } 2.46$ suggests that the interpersonal interaction variable and the classroom emotional climate variable are statistically considered to have a linear relationship.

The normality test results indicate that the data variables are normally distributed, thus meeting the requirements for using the Product Moment correlation test. The results of the correlation test between teacher interpersonal interaction and classroom emotional climate can be seen in Table 6.

Table 6. Results of Correlation Test Between Variables X and Y

Variable	r calcul ated	r table (5%)	Sig. (2- tailed)	Descr iption
Teacher Interpersonal Interaction and Classroom Emotional Climate	0.387 *	0.312	0.013	Positive Correlation

Based on the correlation test results in Table 6, the calculated r value is 0.387. This value indicates a relationship between variable X and variable Y with a weak or low category since it falls within the range of 0.200 – 0.399. The significance value obtained is $0.013 < 0.05$ or at a 5% significance level. This indicates that H_0 is rejected and H_a is accepted, meaning a significant positive relationship exists between teacher interpersonal interaction and classroom emotional climate in Biology learning under the Merdeka Curriculum.

The positive correlation coefficient indicates that the higher the teacher-student interpersonal interaction, the higher the classroom emotional climate in Biology learning under the Merdeka Curriculum, and vice versa. The research results show that the interpersonal interaction variable and the classroom emotional climate variable fall into the same category, namely the moderate category. Therefore, it can be concluded that a positive relationship exists between the independent variable (teacher interpersonal interaction) and the dependent variable (classroom emotional climate), as when the independent variable falls into the moderate category, the dependent variable tends to fall into the same category. This relationship arises because changes in the independent variable directly influence the dependent variable.

The coefficient of determination test is conducted to determine the extent of the contribution of the independent variable (X) to the dependent variable (Y). The results of the coefficient of determination test are presented in Table 7.

Table 7. Results of Coefficient of Determination

Variable	Test	
	R Square (R ²)	Coefficient of Determination (KD)
Teacher Interpersonal Interaction and Classroom Emotional Climate	0.149	14,9%

From the calculations in Table 7, the contribution of the teacher interpersonal interaction variable to the classroom emotional climate variable in Biology learning is analyzed through percentage calculations, resulting in 14.9%. Thus, teacher interpersonal interaction accounts for 14.9% of the variation in the classroom emotional climate in Biology learning for students, while 85.1% is influenced by other factors not analyzed in this study. Although teacher interpersonal interaction contributes 14.9% to the classroom emotional climate in Biology learning, this contribution is relatively low. This finding suggests that many other factors, such as peer relationships, individual student characteristics, and the broader school climate, may play a more significant role in shaping students' emotional perceptions within the classroom (Reyes *et al.*, 2020; Ramli *et al.*, 2022). It also reflects the complexity of emotional dynamics in the classroom and highlights the challenges associated with effectively implementing the Merdeka Curriculum.

According to Sucipto *et al.* (2023), many teachers have a limited understanding of inquiry-based learning designs, which restricts opportunities for students to engage in scientific exploration and critical thinking. Furthermore, Umayrah and Wahyudin (2023) report that educators often struggle to implement differentiated instruction effectively due to difficulties in accurately assessing diverse student needs and tailoring learning accordingly. Aprilia *et al.* (2023) add that fostering students' independent learning habits remains challenging, as low student motivation and limited active participation hinder the learning process. These issues collectively hinder teachers' capacity to

build meaningful interpersonal engagement that supports a positive emotional classroom climate. Therefore, strengthening teacher-student interpersonal relationships is essential to meet the demands of the Merdeka Curriculum, which emphasizes student-centered learning and character development (Faizah & Ramadan, 2024).

The relationship between teacher interpersonal interaction and classroom emotional climate can be explained by the crucial function of these abilities in addressing various challenges during the learning process. Positive interpersonal interactions between teachers and students, characterized by empathy, emotional support, and effective communication, play a significant role in building a positive classroom emotional climate. Research by McLure *et al.*, (2022) shows that a positive classroom emotional climate, created from friendly teacher-student interpersonal relationships, contributes to better student attitudes toward learning. In line with this Ma & Wei, (2022) show that students' perceptions of a positive classroom climate are closely related to increased learning engagement and academic achievement.

In the context of the Merdeka Curriculum implementation, Biology learning emphasizes the importance of developing critical thinking skills, creativity, and problem-solving abilities, both independently and collaboratively (Sari & Ferry, 2024). The Biology Learning Outcomes (CP) call for students to actively design, observe, and conduct scientific investigations (Kemendikbudristek, 2022). The quality of interpersonal interaction between teachers and students is the key to building a conducive classroom climate to develop students' scientific character and process skills.

The emotional support offered by a teacher has been shown to increase student participation., as explained by Sadriani & GH2M (2024), who found that a positive classroom emotional climate can strengthen social relationships and encourage active engagement in learning. Additionally, according to Phylosophie *et al.*, (2024) a positive emotional climate can enhance student engagement, motivation to learn, and understanding of science material. Conversely, a negative emotional climate can decrease interest

in learning and hinder students' learning processes.

The positive and significant correlation results in this study reinforce the understanding that the better the quality of interpersonal interactions established, the more positive the emotional climate formed in the classroom. The previous statement is supported by findings from [Wang \(2023\)](#), emphasizing that high emotional intelligence is crucial for teachers in creating harmonious interpersonal relationships that foster a positive classroom emotional climate and a comfortable and conducive learning atmosphere. Thus, in implementing the Merdeka Curriculum, the quality of teachers' interpersonal relationships constitutes a fundamental basis for creating a classroom emotional climate that supports innovative Biology learning and fosters optimal educational outcomes.

According to [Gao \(2021\)](#) and [Xie and Derakhshan \(2021\)](#), teachers should possess interpersonal skills and actively apply them in classroom practice. In Biology learning, teachers can facilitate open scientific discussions to encourage students to express their opinions, provide emotional reinforcement when students face confusion during experiments, and conduct joint reflection sessions after practicums to foster empathy and self-awareness. [Valente and Lourenço \(2020\)](#) emphasize that an emotionally safe learning environment can enhance student motivation and participation.

Within the context of the Merdeka Curriculum, teachers can also engage students in projects based on local environmental issues, such as school waste management or ecosystem preservation, which require collaboration, open communication, and intensive interpersonal guidance from the teacher. Therefore, professional development programs should include training in emotional intelligence and strategies for building positive classroom relationships ([Zheng, 2023](#)). By fostering strong interpersonal connections, teachers will be better equipped to meet students' emotional needs and support the effective implementation of the Merdeka Curriculum ([Berlianti et al., 2025](#)).

The analysis reveals a significant relationship between teacher interpersonal interaction and the classroom emotional climate in Biology instruction for Grade XI MIPA students within the

Merdeka Curriculum Framework. The higher the degree of teacher interpersonal interaction established, the better the classroom emotional climate formed among students. Conversely, the lower the level of teacher interpersonal interaction, the worse the classroom emotional climate is created among students.

4. CONCLUSION

Based on the research findings and data analysis, there is a positive and significant relationship between teacher interpersonal interaction and the emotional climate of the classroom in Biology learning under the Merdeka Curriculum at public high schools in West Bogor City. However, the strength of this relationship is relatively weak, with a contribution of only 14.9%. Such findings suggest that other factors play a more dominant role in shaping the classroom's emotional climate. Biology teachers in this context generally demonstrate Tolerant and Authoritative interpersonal profiles. Therefore, teachers are encouraged to enhance their interpersonal interactions by implementing case-based learning and simple, real-life experiments. These strategies can help create a more engaging and emotionally supportive classroom atmosphere in alignment with the principles of the Merdeka Curriculum.

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