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Research Article

From engagement to motivation: A diary study on how teaching experience shape student learning dynamics

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Teacher engagement plays a crucial role in shaping student motivation at both individual and group levels. This study employed a Hierarchical Linear Modeling approach to analyze the dynamic relationship between teacher engagement and student motivation, considering the contributions of teaching experience and average teacher engagement at the group level. Data were collected from 112 students and seven teachers over four sessions, resulting in a total of 448 observations at Level 1 (session level) using questionnaires to measure teacher engagement and student motivation. Data analysis used hierarchical linear modeling with Mplus 7.0. The analysis revealed that teacher engagement significantly increased student motivation at the within level. At the between-person level, teacher engagement was found to play a meaningful role in enhancing student motivation. Additionally, teaching experience also contributed positively, indicating that more experienced teachers were generally more effective in fostering student motivation, while teaching experience demonstrated a significant contribution with p = .035. Additionally, a positive correlation was observed between teaching experience and teacher engagement at the group level. To build upon these results, future research is encouraged to adopt a long-term longitudinal design to understand stable patterns. Furthermore, more holistic measurement instruments, such as direct classroom observations and qualitative data, are recommended.

Keywords: Hierarchical linear modelling; Motivation; Teacher engagement; Teaching experience

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1. Introduction

Various studies have demonstrated relationship between motivation and academic achievement (Sharma & Shama, 2018; Steinmayr et al., 2019). Students with higher levels of motivation tend to exhibit better academic performance. Motivation is a critical factor for current academic success and the development of skills essential for future endeavors (Bai & Wang, 2023; Lin et al., 2022). Skills such as critical thinking, creativity, and collaboration, which are increasingly vital in a connected and technology-driven world, largely depend on a student's motivation to learn and grow. Strong motivation encourages students to be more proactive, engaging in independent, creative, and problem-solving-based learning approaches (Haug & Mork, 2021; Papanastasiou et al., 2019). However, students often face challenges that impede their motivation (Garcia & Pintrich,

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2022). Factors such as academic pressure, boredom (Madigan & Kim, 2021) with traditional teaching methods (Filgona et al., 2020), and the lack of relevance of learning materials to their daily lives frequently contribute to a decline in motivation (Mazana et al., 2018). Additionally, teachers, as planners and facilitators of learning, play a very important role in influencing students' motivation levels.

Teachers play a key role in fostering an environment that supports student motivation (Filgona et al., 2020; Tambunan et al., 2021). One of the most critical aspects of this is teacher engagement, which refers to the extent to which teachers are actively involved in the learning process and capable of creating engaging learning experiences for students (Amerstorfer & Freiin von Münster-Kistner, 2021; Cents-Boonstra et al., 2021a; Cinches et al., 2017; Sadoughi & Hejazi, 2021a). Teacher engagement encompasses various dimensions, including actively fostering a positive learning environment, delivering material effectively, providing constructive feedback, and adapting teaching methods to meet students' diverse needs (Sadoughi & Hejazi, 2021a). High levels of teacher engagement are widely regarded as a crucial factor in creating effective learning experiences. Engaged teachers impart knowledge and cultivate supportive relationships with students, encouraging them to work harder and stay motivated in their studies (Chacon Valdez et al., 2024; Scales et al., 2020).

Empirical evidence indicates a positive relationship between teacher engagement and student motivation (Chacon Valdez et al., 2024; Scales et al., 2020; Zee et al., 2021). Teachers who actively design relevant learning experiences, are responsive to students' needs, and incorporate innovative approaches can effectively encourage students to remain motivated and engaged in learning activities. Sustained teacher engagement, particularly in providing constructive feedback and supporting students' individual development, is essential for maintaining their motivation (Cents-Boonstra et al., 2021a; Dorimana et al., 2022; Scales et al., 2020). Moreover, engaged teachers are more likely to create a classroom atmosphere that fosters student success, which can directly enhance both their motivation and academic performance (Rusticus et al., 2023). This pattern of findings has been corroborated through experimental designs, demonstrating a significant positive relationship between teacher engagement and group performance (Sankar & Benjamin, 2024).

The relationship between teacher engagement and student motivation remains highly significant, particularly in terms of the analytical approach and scope of research (Gaspard & Lauermann, 2021; Leal-Soto et al., 2018). Most prior studies have employed cross-sectional designs, which capture data at a single point in time (Ayalew et al., 2019; Azila-Gbettor et al., 2021; Sarkis et al., 2020). While informative, this approach fails to account for the dynamic nature of student motivation, which fluctuates over time and is influenced by various temporal factors, including teacher engagement (Epskamp et al., 2018; Spector, 2019). Understanding how student motivation evolves is essential for designing more effective interventions to enhance the learning experience (Streib, 2018).

Furthermore, previous research has often prioritized learning outcomes as the dependent variable. At the same time, student motivation is typically treated as a secondary factor rather than a variable deserving of in-depth analysis (Vela et al., 2024). This perspective has resulted in limited attention to motivation despite its critical role in fostering successful learning. In particular, how teacher engagement influences student motivation daily remains underexplored (Ho & Lee, 2024). Another noteworthy limitation in prior studies is the minimal adoption of innovative methods, such as diary studies. This approach offers the unique ability to capture real-time changes in students' motivation within the context of their daily lives, an aspect often overlooked by traditional research methods (Garn et al., 2019). By utilizing diary studies, the dynamic interactions between teachers and students can be analyzed more comprehensively, providing more prosperous, more contextual, and accurate insights into the mechanisms driving student motivation (Beymer & Robinson, 2022).

The present study adopted diary study method. The research explores the dynamic relationship between teacher engagement and student motivation across multiple learning sessions. By

utilizing the diary study method, this study seeks to provide deeper insights into the fluctuations in student motivation and examine the mediating role of teaching experience in the relationship between teacher engagement and student motivation.

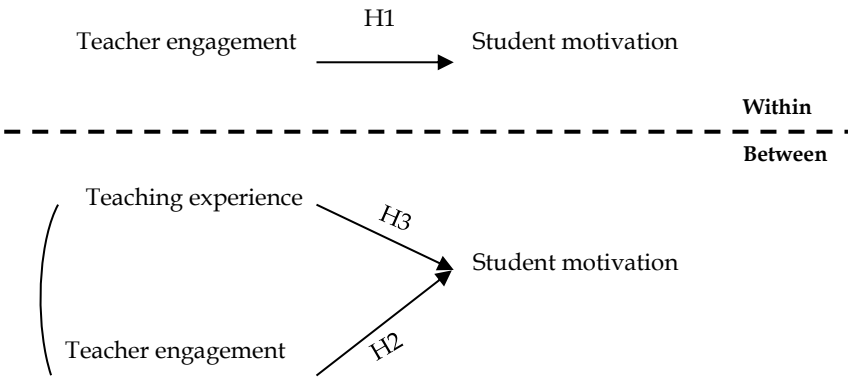
2. Literature Review

Engaged teachers are often better equipped to identify and address students' motivational needs. Previous research has demonstrated that high levels of teacher engagement can significantly enhance student motivation, mainly when teachers design relevant learning experiences and encourage critical thinking. For instance, (Scales et al., 2020) found that teacher engagement in fostering a supportive learning environment can substantially boost student motivation. This is because strengthening the student-teacher relationship helps students feel valued and encouraged to actively participate in the learning process actively, ultimately improving their academic performance through heightened motivation (Wang et al., 2022).

According to Self-Determination Theory [SDT], students' intrinsic motivation is more likely to flourish when they feel a sense of control over their learning, experience competence, and perceive the learning as relevant to their lives (Ryan & Deci, 2020) even autonomous motivation partially mediates the relationship between creativity and creative performance (Ji & Chang, 2024). High levels of teacher engagement can foster these conditions by giving students autonomy in their learning, manageable challenges, and supportive relationships (Shank et al., 2024). Additionally, Atkinson's theory of achievement motivation highlights the role of teacher engagement in creating realistic expectations and supporting students in achieving their goals (Bempechat, 2015). Teachers who actively provide constructive feedback can positively influence students' motivation, encouraging them to put more effort into reaching their academic objectives. We propose the following hypotheses based on these theoretical frameworks and previous empirical findings. H1: Teacher engagement is positively related to student motivation at the individual level. H2: Average teacher engagement is positively related to student motivation at the group level.

Teaching experience is a key factor influencing a teacher's effectiveness in designing, managing, and evaluating the learning process (Podolsky et al., 2019). Teachers with more extensive experience generally possess a deeper understanding of student needs, classroom dynamics, and effective instructional strategies (Chemlali et al., 2024; Sølvik & Glenna, 2022). A study by Li et al. (2023) indicates that teachers who proactively initiate dialogue, respond to students' needs, exchange emotion-based information, treat students respectfully, and express motivation and expectations foster stronger teacher-student relationships and enhance student engagement. This is reflected in Hypothesis 3, which states that teaching experience is positively related to student motivation at the group level. The overall hypothesized research model is presented in Figure 1.

Figure 1
Overview of research model



This study employs a hierarchical linear design with two levels to examine the influence of teacher engagement on students motivation at school. This multilevel allows for the analysis of both within and beetween.

3. Method

3.1 Research Design

This research employs diary study approach to collect data repeatedly over a specified period. The diary study method guides participants to record their activities regularly within a predetermined time frame. This technique enables real-time data collection within the participants' natural environments, yielding in-depth and contextually rich information (Nezlek, 2020). The approach not only facilitates accurate data collection from multiple perspectives (teachers and students), but also offers valuable insights into the ongoing dynamics between teacher engagement and student motivation within the learning context. In this study, we adopted a face-to-face learning desin and conducted a multi-source assessment involving teachers and students over four consecutive weeks.

3.2. Participants

The participants in this study consisted of 112 public high school students, aged 15 to 17 years, from Pekanbaru, Indonesia. Students were selected from classes based on recommendations and formal approval provided by the school administration. Only those who had established instructional interactions with the participating teachers were included in the study. This criterion was essential for capturing the authentic, day to day dynamics of teacher engagement and its influence on student motivation. Furthermore, informed consent was obtained from both students and teachers, and participation was entirely voluntary.

In terms of sample size, we referred to prior study literature to establish a justified minimum number of participants. Gabriel et al. (2019), in their review of 90 diary studies in educational settings, recommended a minimum of 83 participants for a three-day diary protocol to ensure sufficient statistical power for multilevel analyses. Our study extended this recommendation by adopting a four-week diary design. We initially aimed to recruit 120 students to account for potential attrition, and ultimately retained 112 complete all four waves, resulting in 448 entry. This sample size exceeds the common thresholds recommended in multilevel modeling literature.

3.3. Data Collection

In the initial stage, all participants completed a general demographic questionnaire to provide personal information and indicate their willingness to participate. Subsequently, students were asked to complete a motivation questionnaire four times, following the class learning schedule. The questionnaires were completed in real time, at the end of each learning session, to measure student motivation repeatedly within their natural environment. On the other hand, teachers completed the teacher engagement questionnaire the same day after their teaching sessions with the students who were part of the research sample

Teacher engagement was measured using the Utrecht Work Engagement Scale [UWES], which is specifically designed to assess the level of engagement among teachers. The UWES evaluates three main dimensions of engagement: vigor, dedication, and absorption. We adapted this instrument to a 5-point Likert scale, ranging from "disagree" (1) to "strongly agree" (5). Given this modification, we conducted a Confirmatory Factor Analysis [CFA] to examine the factor structure of the UWES in the context of teacher engagement. The CFA results confirmed that the three-dimensional model of the UWES fit the research data well, demonstrating the instrument's construct validity and reliability for measuring teacher engagement. Detailed results of the CFA analysis are presented in the results and discussion section. These findings support using the UWES as a reliable and valid tool for measuring teacher engagement.

Student motivation was measured using the Course Interest Scale [CIS] developed by Keller (2009), which consists of 34 items designed to assess four main indicators: attention, relevance, confidence, and satisfaction. Example items include, "I feel confident that I will succeed in today's course" and "I feel somewhat disappointed with today's learning." This instrument employs a 5-point Likert scale, with values ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The reliability of each indicator was evaluated using Cronbach's alpha, yielding the following results: Attention (0.84), Relevance (0.84), Confidence (0.81), and Satisfaction (0.88). These values indicate a good level of reliability for each indicator, confirming that the CIS is a suitable instrument for measuring student motivation.

3.4. Data Analysis

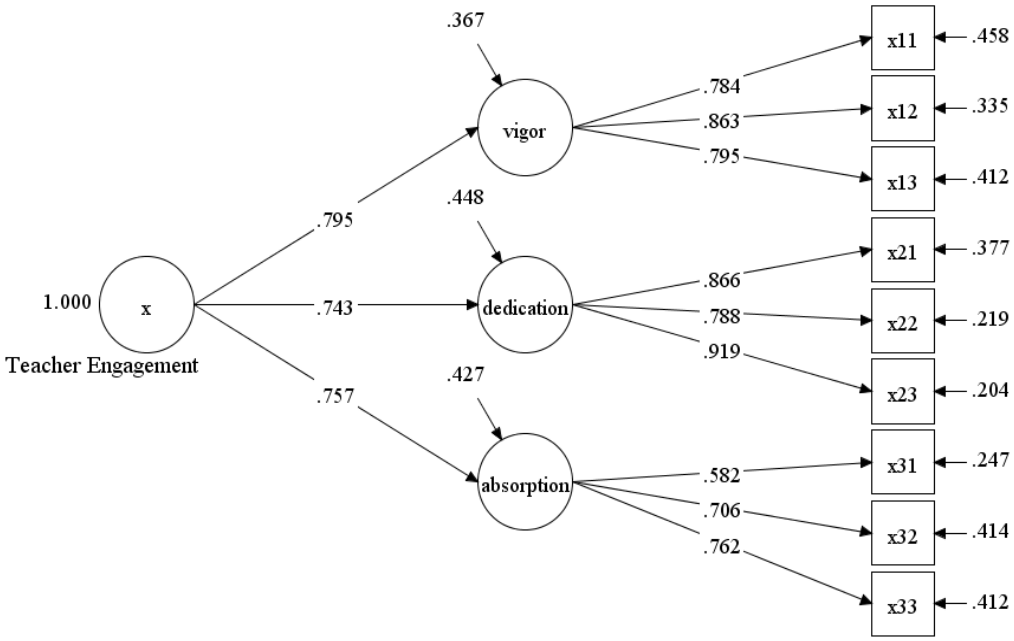
Given the hierarchical nature of the data, this study utilized Mplus 7.0 to conduct hierarchical linear modeling, where 112 students, and each student was observed over four sessions, resulting in a total of 448 observations at Level 1 (session level). The analysis adopted a two-level modeling approach to account for dependencies within the data: Level 1 represented session-specific observations for individual students. In contrast, Level 2 captured between-teacher variability, including teacher engagement and teaching experience. To ensure accurate interpretation of results, we employed person-mean centering for session-level predictors (e.g., student motivation) and grand-mean centering for teacher-level predictors (e.g., teacher engagement and teaching experience).

4. Results and Discussion

4.1. Confirmatory Factor Analysis of Teacher Engagement

To understand the conceptual structure of teacher engagement, the researchers conducted a Confirmatory Factor Analysis on the three primary dimensions of teacher engagement: vigor, dedication, and absorption. Figure 2 presents the outcomes of this analysis, including the factor loadings for each indicator and the correlations between dimensions, thereby demonstrating the robustness of the teacher engagement measurement model used in this study.

Figure 2
Results of the confirmatory factor analysis for teacher engagement



The results of the CFA confirm that teacher engagement is a multidimensional construct that can be reliably measured. As shown in Figure 2, all indicators of teacher engagement exhibit high factor loadings (greater than 0.7), indicating that each indicator consistently reflects the underlying

dimensions of teacher engagement. The relationships between vigor, dedication, and absorption are also significant, with correlations ranging from 0.367 to 0.757, thereby supporting the construct validity of teacher engagement. These three dimensions align with various aspects of teacher engagement, as defined by work engagement theory (Borst et al., 2019). The vigor dimension, which reflects the energy and enthusiasm of teachers in their teaching, demonstrates factor loadings ranging from 0.784 to 0.863. The dedication dimension, representing the teacher's commitment and pride in their work, shows the highest factor loadings, ranging from 0.788 to 0.919. Lastly, the absorption dimension, which describes the teacher's level of focus and immersion in teaching activities, has factor loadings ranging from 0.582 to 0.762.

4.2. Hierarchical Linear Modeling Hypotheses Testing

We tested the relationships between teacher engagement, teaching experience, and student motivation using the Hierarchical Linear Modeling [HLM] approach, implemented with Mplus software. This model is designed to account for the complexity of hierarchically structured data, with students as units at Level 1 and teachers as units at Level 2. Table 1 presents the results of the Mplus analysis, displaying the estimated model parameters and their statistical interpretations.

Table 1
HLM estimates for models of teacher engagement, teaching experience, student motivation

Variable	*Estimate*	*S.E.*	*Est/S.E.*	*Two-Tails P-Value*
Within Level				
Motivation (Y) ON teacher engagement (X)	1.376	0.551	2.496	.013
Residual Variance Y	73.159	7.921	9.236	<.001
Between Level				
Motivation (Y) ON teacher experience (M)	0.114	0.042	2.742	.006
Motivation (Y) ON teacher engagement (Y)(C)	1.854	0.882	2.104	.035
Intercepts Y	57.571	24.25	2.373	.018
Residual Variances Y	1.794	1.157	1.550	.121

The analysis results indicate that teacher engagement significantly influences student motivation, both at the individual student level (within level) and between teachers (between levels). At the within level, teacher engagement has an estimated 1.376 with a p-value of .013, suggesting that higher teacher engagement in the learning process is associated with increased student motivation. This finding reveals a significant positive relationship between teacher engagement and student motivation. Specifically, teachers who are more emotionally, cognitively, and physically engaged in teaching tend to foster greater student motivation (Chen & Liu, 2022; Szulc-Kurpaska, 2023). These results support the first hypothesis of this study, which states that teacher engagement is positively related to student motivation. In social motivation theory, teacher engagement is a key driver that enhances student interest, focus, and participation in learning activities. Teachers who demonstrate vigor, dedication, and absorption create a more supportive and engaging learning environment, thereby boosting student motivation (Chen & Liu, 2022; Jaakkola et al., 2017). Teacher performance and enthusiasm can be improved by giving recognition to teacher performance and providing psychological support (Mutesasira, & Marongwe, 2024)

Empirically, previous research underscores the vital role of teacher engagement in fostering positive relationships with students, which, in turn, enhances students' motivation to engage in learning (Chen & Liu, 2022; Jaakkola et al., 2017; Szulc-Kurpaska, 2023). This finding aligns with a study by Martinez & Wighting (2023, which demonstrated that teachers who exhibit high levels of engagement can better establish emotional connections with students, leading to a greater sense of support and increased motivation to achieve improved learning outcomes. Other studies have also confirmed that teacher-related factors, especially engagement and support, contribute to student achievement (Amerstorfer & Freiin von Münster-Kistner, 2021; Sadoughi & Hejazi, 2021b). Theoretically, Self-Determination Theory offers a relevant framework for understanding this

relationship. High teacher engagement helps fulfill students' basic psychological needs, such as the need for autonomy, competence, and social connection (Ryan & Deci, 2020). For instance, when teachers display strong dedication, students feel valued and accepted, which enhances their sense of belonging to the learning environment. Teacher engagement increases students' intrinsic motivation to learn by satisfying these needs.

In this study, we also included effect size estimates to indicate the extent of the influence of teacher engagement on motivation. The results of this analysis are presented in Table 2.

Table 2
ANOVA summary for the effect of teacher engagement on student motivation

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Square*
Corrected Model	34143.351[a]	1	34143.351	338.540	<.001	.432
Intercept	50161.341	1	50161.341	497.363	<.001	.537
Engagement	34143.351	1	34143.351	338.540	<.001	.432
Error	44981.140	446	100.855			
Total	6173014.000	448				
Corrected Total	79124.491	447				

Note. a.R Squared = .432 (Adjusted R Squared = .430)

As shown in Table 2, the analysis results indicate that teacher engagement has a significant effect on students' learning motivation. The ANOVA results reveal that teacher engagement significantly predicts student motivation ($F(1, 446) = 338.540$, $p < .001$), accounting for 43.2% of the variance in motivation, as reflected by the partial eta squared value of .432. This value represents a large effect, indicating that teacher engagement is not only statistically significant but also has a strong practical impact on students' motivation levels. These findings suggest that the higher the level of teacher engagement during the learning process, the greater the students' motivation to learn. This finding is consistent with previous research showing that supportive and actively involved teacher behavior can enhance both student motivation and engagement in learning (Robinson, 2022; Sadoughi & Hejazi, 2023). Teachers who provide opportunities for experimentation and offer active guidance during instruction can foster higher levels of student engagement and motivation (De Loof et al., 2021). Furthermore, research grounded in self-determination theory also highlights that teacher engagement which supports students' basic psychological needs, such as autonomy, competence, and relatedness can contribute to increased intrinsic motivation (Ryan et al., 2021; Ryan & Deci, 2020; Schweder et al., 2025).

Teaching experience significantly influences student motivation at the between level, with an estimate of 0.114 and a p-value of .006. This finding supports the third hypothesis of the study, which posits that teacher experience is positively related to student motivation at the group level. Specifically, it suggests that teachers with more experience are generally better equipped to motivate their students. Previous research also supports this notion, showing that more extended teaching experience enhances teachers' ability to design relevant and engaging student lessons (Podolsky et al., 2019; Sølvik & Glenna, 2022). This is consistent with expertise development theory, which argues that teaching experience enables teachers to refine and implement more effective learning strategies (Mayeaux & Olivier, 2022).

Furthermore, teacher engagement at the between levels also significantly contributes to student motivation, with an estimate of 1.854 and a p-value of .035. This finding confirms that teacher engagement impacts individual students and has collective effects at the group level, as proposed in the second hypothesis. Additionally, the results support the fourth hypothesis, which states that teaching experience is positively correlated with overall teacher engagement, with a p-value of .035. Figure 3 presents the conceptual model based on the results of the Mplus analysis, illustrating the significant paths to clarify the relationships between the research variables.

Figure 3
Mplus analysis of model results

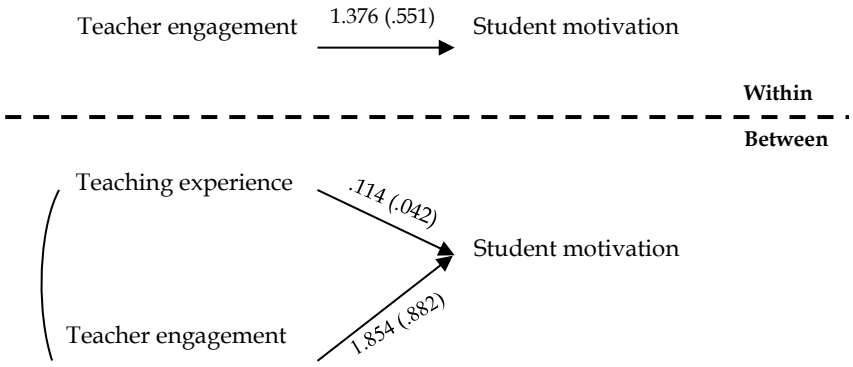


Figure 3 illustrates the identification of hierarchical relationships and cross-level variables that influence student motivation while testing the constructs' theoretical validity. Teacher engagement significantly impacts student motivation both at the individual student level (within level) and at the group level (between levels). At the within level, teacher engagement significantlypositively affects student motivation, with an estimated coefficient of 1.376 and a standard error of 0.551. This finding suggests that increased teacher engagement in the learning process directly enhances student motivation at the individual level. Empirically, studies by Martinez and Wighting (2023) and De Loof et al (2021) also demonstrate that actively engaged teachers are more effective in motivating students and encouraging their participation in learning activities. Furthermore, the findings of (Cents-Boonstra et al., 2021b) revealed that teachers who provide students with opportunities to experiment and offer active guidance throughout the learning process significantly enhance student engagement in the classroom. This result aligns with teacher engagement theory, which posits that high levels of teacher engagement foster a learning environment that supports student motivation (Gaspard & Lauermann, 2021; Szulc-Kurpaska, 2023). At the between level, two variables significantly influence student motivation: teacher teaching experience and average teacher engagement. Teaching experience exerts a positive influence with a coefficient of 0.114 (standard error = 0.042), although the effect is relatively small. This suggests that more experienced teachers tend to have better skills in classroom management, building student relationships, and designing engaging lessons, aligning with expert teachers (Backfisch et al., 2020; Mayeaux & Olivier, 2022). In contrast, average teacher engagement substantially influences student motivation, with a coefficient of 1.854. These findings indicate that consistent teacher engagement at the group or class level significantly enhances student motivation. Previous research supports this by demonstrating that high levels of teacher engagement at the group level foster a positive classroom climate, boosting collective student motivation (Cinches et al., 2017; Wang et al., 2022).

Additionally, a positive correlation of 0.114 between teaching experience and average teacher engagement indicates that more experienced teachers tend to exhibit higher levels of engagement. This is consistent with teacher professional development theory, which asserts that extended teaching experience enhances teachers' commitment and skills, enabling them to be more actively involved in the learning process (Gore & Rickards, 2021; Podolsky et al., 2019). Overall, these results underscore the importance of teacher engagement as a critical factor in increasing student motivation, both at the individual and group levels. In the context of this study, the findings suggest that high levels of teacher engagement not only enhance individual student motivation but also have consistently positive effects across all learning sessions. Engaged teachers are more likely to foster a classroom environment that is dynamic, well-organized, and conducive to active student participation.

5. Conclusion

Teacher engagement plays a crucial role in enhancing student motivation, both at the individual (within) and group (between) levels. At the individual level, teacher engagement has a direct and significant positive effect on student motivation, indicating that actively engaged teachers have a tangible impact on student motivation during each learning session. At the group level, teacher teaching experience contributes positively, though to a lesser extent, to student motivation. In contrast, average teacher engagement at the classroom level exerts a much stronger influence on motivation. Furthermore, a positive relationship between teaching experience and average teacher engagement suggests that more experienced teachers are generally more engaged in learning, boosting student motivation.

6. Limitations and Future Directions

The limitations of this study include the use of self-reported questionnaires to measure both teacher engagement and student motivation, which may introduce response biases, as participants' perceptions might not always align with their actual behaviors or outcomes. Lastly, the study only considered teacher engagement and teaching experience as key variables, without exploring other influencing factors, such as classroom climate, curriculum, or student characteristics. For future research, long-term longitudinal studies could provide a deeper understanding of the stable patterns of change in teacher engagement and student motivation. This kind of study will allow researchers to track these relationships over time, including the influence of external factors.

Author contributions: Each author made an equal contribution to the current study and has read and given their approval to the article's final published version.

Declaration of interest: The authors declared that there were no potential conflicts of interest.

Data availability: The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethical statement: Authors declared that the study was approved by The Directorate of Research and Community Service, Universitas Islam Riau on 22 July 2024 with approval code 392/E-UIR/27-DPPM/2024. All participants provided informed consent prior to their engagement in the study. They were informed about the purpose od the study, procedures, and their right to withdraw at any time without any consequences.

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