

Student Engagement in Blended Mathematics Learning: The Role of Perceived Teaching Performance and Learning Attitudes

Leonardo Jr., S. Rulida

Davao del Sur State College, Digos City, Davao del Sur, Philippines

Author Email: leonardo.rulida@dssc.edu.ph

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Abstract. The engagement of college students in mathematics presents significant challenges; nevertheless, it is crucial for effective teaching and learning in higher education, particularly in blended learning environments. This study examined the combined effect of college instructors' perceived teaching performance and students' attitudes in learning on the mathematical engagement of Bachelor of Secondary Education (BSED) mathematics students. Data from 120 students were analyzed using a quantitative, non-experimental design with a predictive correlation approach. The stratified analysis showed strong correlations between the perceived teaching performance of college instructors, students' attitudes in learning, and the student's mathematics engagement. The regression analysis further demonstrated how these factors collectively influence students' engagement in mathematics. In light of these findings, educators and institutions should focus on enhancing instructional quality, fostering positive student attitudes, and creating engaging learning environments to support meaningful mathematics engagement and improved outcomes. Prioritizing faculty development and implementing targeted interventions can strengthen teaching effectiveness and student mindset—critical for sustained engagement and academic success in blended learning settings. These efforts can lead to higher performance, better learning experiences, and long-term student success.

Keywords: Attitude in learning; Blended learning environment; Engagement; Mathematics; Perceived teaching performance.

1.0 Introduction

Blended learning, which combines conventional in-person instruction with online education, has become increasingly significant in contemporary education (Alammery, 2024). However, consistent student engagement in this mixed environment remains a persistent challenge, particularly in mathematics. Research suggests blended learning can enhance student interaction, self-directed learning, and motivation—especially when supported by high-quality teaching and a positive student mindset (De Bruijn-Smolters & Persin, 2024; Shi et al., 2022). These elements underscore the central role of engagement in fostering success in mathematics education (McMullen et al., 2023).

Despite these benefits, student disengagement in mathematics remains a global concern. Studies consistently report low participation, fluctuating motivation, and negative attitudes toward mathematics (Joshi et al., 2022;

Balentyne & Varga, 2017; Xia et al., 2022; Steele et al., 2019). In particular, disengagement is often linked to ineffective instructional approaches and student experiences that erode confidence and interest (Skilling et al., 2021; Croft & Grove, 2015; Everingham et al., 2017). This issue is equally prevalent in the Philippines, where several studies have noted persistent challenges with student engagement in mathematics, especially in blended learning contexts. For instance, Llorente and Tado (2024) and Poquita (2023) highlight low enthusiasm and a lack of student confidence, while Peteros et al. (2022) report high failure rates in math-related subjects. Manatad and Baluyos (2023) emphasizes the importance of student satisfaction and positive attitudes, which are often difficult to sustain. Furthermore, Torrejos (2024) points to the inconsistent quality of teaching performance in blended classrooms as a barrier to effective engagement.

As blended learning environments become increasingly common, it is essential to understand the relationship between instructors' perceived teaching effectiveness, their attitudes in learning, and student engagement in mathematics. A significant gap in research exists regarding the engagement of college students in mathematics, particularly within the context of higher education. Studies indicate that effective instruction positively impacts students' understanding and creates an atmosphere that promotes greater cognitive engagement. However, the existing literature lacks insights into the interplay of these factors, especially among BSED Mathematics students in blended learning settings. These deficiencies in understanding student attitudes and teaching effectiveness suggest that, without targeted interventions, student engagement in mathematics within blended learning environments may continue to diminish, ultimately affecting academic outcomes. Given these circumstances, the researcher recognizes the urgent need to conduct this study.

2.0 Methodology

2.1 Research Design

This research employed a quantitative, non-experimental design incorporating a predictive correlation approach. The quantitative method and its specific research design evaluate concepts by formulating hypotheses and collecting data to either support or refute them (Creswell, 2021). The study utilized descriptive methods to assess variables such as instructors' perceived teaching performance quantitatively, students' attitude in learning, and engagement in mathematics among BSED Mathematics students. Correlational analysis was conducted to validate significant relationships between two or more variables by enhancing statistical correlations. Specifically, the study investigated the correlation between instructors' perceived teaching performance, students' attitudes in learning, and their engagement in mathematics. Additionally, the researcher employed multiple regression analysis to explore the structural connections between observable variables and latent constructs (Hair et al., 2019). It will examine the influence of instructors' perceived teaching performance and students' attitudes in learning on their engagement in mathematics.

2.2 Research Participants

The study's respondents were the BSED – Mathematics students enrolled in the second semester for the academic year 2024 – 2025. The respondents were selected using a stratified random sampling method. A total of 120 respondents were utilized in this study.

2.3 Research Instrument

The modified Teacher Effectiveness Performance Evaluation System Questionnaire by Stronge (2012) assessed teachers' performance. In contrast, students' attitudes in learning mathematics were measured using a modified questionnaire that Kasimu and Imoro (2017) developed. Additionally, the modified Students' Involvement in Mathematics questionnaire from Flores et al. (2021) was employed to evaluate students' participation in the course. All instruments utilized a 5-point Likert scale, allowing students to rate their responses from 1 (strongly disagree) to 5 (strongly agree).

2.4 Data Gathering Procedure

Formal approval was obtained from the Dean of the Institute of Teacher Education (ITED) and the Vice President for Academic Affairs (VPAA) prior to data collection. After that, the questionnaires were distributed online via Google Forms. Respondents were invited to participate voluntarily and answered the survey honestly. Completed responses were collected, organized, and analyzed using appropriate statistical methods to interpret the results.

2.5 Ethical Considerations

Maintaining ethical norms in research is crucial for promoting integrity, protecting participants, and enhancing the legitimacy of scientific advancement (Bhandari, 2021). The researcher rigorously complied with the ethical guidelines established by the Research, Development and Innovation of Davao del Sur State College (RDI - DSSC) to uphold this study's integrity and ethical standards. Confidentiality and anonymity will be maintained by de-identifying all data and using it solely for research purposes. The study adheres to the concepts of data privacy, security, and ethical responsibility, conforming to the moral requirements of ethical research.

3.0 Results and Discussion

3.1 Perceived Teaching Performance of Teachers and Students' Attitude and Engagement in Mathematics

As shown in Table 1, the overall perceived teaching performance of college instructors received a mean score of 4.16, indicating a "High" level of effectiveness. This suggests that students view their instructors as highly capable of delivering instruction. Instructors demonstrate strong pedagogical skills, clear communication, and effective classroom management, all contributing to a positive learning environment. The rating indicates that students feel well-supported in their academic development, which may lead to higher engagement, improved critical thinking skills, and better learning outcomes. Among the four indicators evaluated, Instructional Planning and Preparation received the highest mean score of 4.27, categorized as "Very High". This reflects that college instructors are highly effective in designing well-structured lesson plans, selecting appropriate teaching materials, and aligning their instructional strategies with learning objectives. Such investment in organizing lessons to cater to students' diverse learning needs can enhance comprehension, engagement, and overall academic performance. In contrast, Assessment and Feedback had the lowest mean score of 4.08, still classified as "High". This indicates a strong commitment from instructors to evaluate student performance and provide guidance for improvement. Instructors effectively implement assessment strategies and offer meaningful feedback that supports student learning. Additionally, students generally perceive the assessment methods as fair, relevant, and aligned with learning objectives, and constructive feedback helps them reflect on their progress.

Table 1. Descriptive Mean Level

Indicators	Mean	Descriptive Level
A. Perceived Teaching Performance		
1. Instructional Planning and Preparation	4.27	Very High
2. Instructional Delivery	4.13	High
3. Classroom Environment	4.14	High
4. Assessment and Feedback	4.08	High
Aggregate Result	4.16	High
B. Attitude in Learning Mathematics		
1. Anxiety	3.13	Moderate
2. Motivation	4.22	Very High
3. Usefulness	4.27	Very High
4. Confidence	4.12	High
Aggregate Result	4.27	Very High
C. Engagement in Mathematics		
1. Cognitive Engagement	4.23	Very High
2. Affective Engagement	4.12	High
3. Behavioral Engagement	4.16	High
Aggregate Result	4.17	High

The college student's attitude in learning mathematics, the overall mean score of 4.27, categorized as "Very High," reflects a predominantly positive attitude toward learning mathematics, indicating that the blended learning approach effectively supports engagement by fostering motivation and demonstrating the subject's perceived usefulness, even as Anxiety remains an area for potential intervention. The highest mean score is Motivation (4.22), indicating "Very High", suggesting that students are highly driven to engage with mathematics. This may stem from the blended learning environment's flexibility and interactive components that promote student autonomy. The lowest mean score is Anxiety (3.13), which indicates "moderate", suggesting that while students remain motivated, they still experience notable discomfort or apprehension in learning mathematics. This could be influenced by the cognitive demands of the subject or the reduced immediate support during independent online tasks.

Finally, the college students' level of engagement in mathematics is rated at 4.17, indicating a "High level" of involvement. This score reflects students who are deeply engaged in their mathematical learning, both mentally and behaviorally, while also fostering a positive emotional connection to the subject. This robust engagement across cognitive, affective, and behavioral domains suggests that students are intellectually committed to mathematical concepts, emotionally inspired, and actively participate in learning activities. Among the three dimensions, cognitive engagement received the highest mean score of 4.23, classified as "Very High." This indicates that students exert substantial mental effort in their mathematical studies, employing critical thinking, problem-solving skills, and thorough processing of concepts. In contrast, affective engagement received the lowest mean score of 4.12, also categorized as "High," indicating that students experience a positive emotional connection to mathematics, marked by interest, enjoyment, and a sense of value in learning the subject.

3.2 Relationship Between Perceived Teaching Performance, Students' Attitude, and Engagement in Mathematics

In Table 2, the correlation analysis reveals that Perceived Teaching Performance of College Instructors holds a strong positive relationship with student engagement in mathematics ($r = .804$, $p = .000$), indicating that effective instructional delivery, clear communication, and supportive teaching methods are pivotal in fostering student involvement in a blended learning environment. Similarly, Attitude in Learning Mathematics demonstrates a moderate positive correlation ($r = .634$, $p = .000$), suggesting that students with a more positive disposition toward the subject are more likely to engage actively. Both findings are statistically significant, underscoring the dual importance of instructor performance and student mindset in promoting engagement. Thus, the first null hypothesis (H_{01}) is rejected, indicating a significant relationship between the perceived teaching performance of college instructors, attitude in learning, and engagement of BSED mathematics students.

Table 2. *Correlation Between Perceived Teaching Performance, Students' Attitude, and Engagement in Mathematics*

	Engagement in Mathematics			
	r	p	Decision on Ho	Interpretation
Perceived Teaching Performance	.80	< .001	Reject	Significant
Attitude in Learning Mathematics	.63	< .001	Reject	Significant

The findings of this study align with previous research that emphasizes the critical role of teaching effectiveness in promoting student engagement in mathematics. Specifically, the results support the work of Durksen et al. (2017), highlighting the significance of teacher-student interactions in enhancing motivation and engagement in mathematics. Kunter et al. (2013) indicated that educators who demonstrate strong pedagogical skills, provide clear instruction, and use student-centered approaches are more likely to boost motivation and engagement in mathematics. Additionally, Wang et al. (2020) found that students who view their professors as intelligent, personable, and supportive are more likely to engage actively in class and develop a stronger interest in the subject. The study also aligns with the findings of Torrejos (2024) that perceived teaching performance plays a significant role in fostering engagement, with effective instructional delivery, clear communication, and supportive teaching practices positively influencing student participation.

The findings of this study align with previous research that emphasizes the significance of a positive attitude in promoting student engagement in mathematics. For instance, Balentyne and Varga (2017) found a relationship between students' attitudes and their achievements in a self-paced blended mathematics course, emphasizing the need to cultivate positive attitudes to enhance engagement. The result also corroborated the study of Manatad and Baluyos (2023) and Carcueva (2024), which found that students' positive attitudes toward mathematics are crucial for their engagement in the subject, impacting their academic achievement in blended learning contexts. Nayir (2015) supports this finding, noting a strong correlation between student engagement and their attitudes. Students with a positive attitude toward mathematics are likelier to actively participate in and engage with their math tasks (Gopal et al., 2018). This engagement is crucial for translating positive attitudes into improved academic performance (Lijie et al., 2020).

3.3 Influence of Perceived Teaching Performance and Attitude in Learning to Students' Engagement in Mathematics

Table 3 shows the regression analysis presents compelling evidence of the critical role of Perceived Teaching Performance and Attitude in Learning Mathematics in shaping student engagement in mathematics within a blended learning environment. The model's strength, reflected in $R = .819$ and $R^2 = .671$, indicates that 67.1% of the variance in student engagement is explained by these two variables — a substantial proportion underscoring their combined influence. Perceived Teaching Performance emerges as the dominant predictor ($\beta = .669$, $t = 8.921$, $p = .000$), highlighting that instructors' ability to deliver clear, engaging, and supportive lessons profoundly drives student participation. This aligns with pedagogical theories emphasizing the instructor's role as a content expert and facilitator of engagement, particularly in blended settings where independent learning is amplified. Attitude in Learning Mathematics also demonstrates a significant, though comparatively smaller, effect ($\beta = .312$, $t = 2.742$, $p = .007$), indicating that students with positive attitudes toward mathematics are more likely to engage actively in the subject. While promoting a favorable disposition toward mathematics can enhance engagement, it may not completely mitigate the disengagement caused by perceptions of ineffective teaching. The model's F-value of 99.039 and $p = .000$ further validate the statistical significance of these predictors, reinforcing that effective teaching practices and student attitudes are not isolated influences but interconnected drivers of engagement. Hence, the second null hypothesis (H_{02}) is rejected.

Table 3. *Regression analysis*

Independent Variables	Unstandardized Coefficients		Standardized Coefficients			Decision	Interpretation
	B	SE	Beta	t	p		
(Constant)	.06	.37		0.16	.873		
Perceived Teaching Performance of College Instructors	.66	.07	.67	8.92	<.001	Reject	Significant
Attitude in Learning Mathematics	.31	.11	.20	2.74	.007	Reject	Significant

$R = .81$; $R^2 = .67$; $F = 99.03$; $p < .001$

These results corroborate recent research emphasizing the impact of teaching effectiveness and attitudes on student engagement. According to Stronge (2018), instructors who demonstrate strong pedagogical skills, structured lesson planning, and active learning strategies create a learning environment that enhances student motivation, participation, and persistence in academic tasks. Similarly, Darling-Hammond et al. (2017) highlight that student-centered teaching approaches that integrate critical thinking exercises improve engagement levels and deepen conceptual understanding in mathematics. The study also corroborated with Torrejos (2024), stating that multiple factors, including instructors' perceived effectiveness, influence student engagement in mathematics. When students are encouraged to think critically, they develop a deeper appreciation for mathematics, leading to higher engagement and better learning outcomes (Wang & Degol, 2017). In addition, the result of the analysis is consistent with the study by Mazana et al. (2019), which found that students' attitudes toward mathematics significantly affect their learning engagement and academic performance. The findings also supported Manatad and Baluyos (2023) research, which indicated that students' positive attitudes toward mathematics play a vital role in their engagement with the subject, affecting their academic success in blended learning environments. Gopal et al. (2018) implied that having a positive attitude towards mathematics influenced students' engagement. When combined with high-quality teaching and a positive student mindset, blended learning environments have enhanced student engagement, self-directed learning, and motivation (Shi et al., 2022). This highlights the need for future research to explore interventions that simultaneously enhance teaching performance and reshape student attitudes, fostering a more resilient and motivated learner mindset — an essential factor in navigating the challenges of blended mathematics education.

4.0 Conclusion

In conclusion, the study findings underscore the significant influence of the perceived teaching performance of college instructors and their attitude in learning on students' engagement in mathematics, affirming the theory used, the Self-Determination theory. The positive correlations between perceived teaching performance, attitude in learning, and engagement in mathematics further highlight the interconnectedness of effective instruction, positive disposition, and student participation in education. This implies that instructors play a vital role in shaping student motivation and learning experiences, emphasizing the need for student-centered, interactive, and reflective teaching strategies. Additionally, the findings suggest that students who view mathematics favorably

are likelier to pursue learning independently, especially in a blended setting where self-directed learning is essential. Strengthening instructional quality and student mindset is critical to fostering sustained engagement and academic success in blended mathematics education.

Educators and educational institutions must prioritize continuous professional development programs to equip instructors with effective teaching strategies tailored for blended environments. Additionally, institutions should implement programs designed to cultivate positive student attitudes toward mathematics — such as mindset interventions, personalized learning approaches, and engaging digital resources — to foster both motivation and confidence. By investing in both instructional quality and student mindset, educators can create a more engaging, supportive, and effective blended learning experience. Further studies should be done to test the robustness of the theory used and strengthen the claims of this study's findings, which this empirical endeavor aims to establish as a foundation for subsequent research. Future research could explore how cultural and socioeconomic factors influence student engagement in blended mathematics education, as well as investigate the long-term effects of teacher training programs on instructional effectiveness. These initiatives can significantly boost students' engagement in mathematics, leading to better learning outcomes, higher academic performance, and greater long-term success.

5.0 Contributions of Authors

The sole author of this research takes full responsibility for all aspects of the study, including the conception, data collection, analysis, writing, editing, and finalizing publication.

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7.0 Conflict of Interests

The author asserts that no conflict of interest exists for the publication of this research.

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9.0 References

- Alammary, A. S. (2024). Optimizing components selection in blended learning: Toward sustainable students engagement and success. *Sustainability*, 16(12), 4923. <https://doi.org/10.3390/su16124923>
- Balentyne, P., & Varga, M. A. (2017). Attitudes and achievement in a self-paced blended Mathematics course. *Journal of Online Learning Research*, 3(1), 55-72. <https://tinyurl.com/mx92yx98>
- Bhandari, K. (2021). Social sanctions of leisure and tourism constraints in Nepal. *Tourist Studies*, 21(2), 300-316. <https://doi.org/10.1177/1468797620955248>
- Carcueva, R. E. (2024). Attitude in learning as a mediator for engagement and academic performance in Mathematics. *Journal of Interdisciplinary Perspectives*, 2(6), 188-196. <https://doi.org/10.69569/jip.2024.0097>
- Creswell, J. W. (2021). A concise introduction to mixed methods research. SAGE publications.
- Croft, T., & Grove, M. (2015). Progression within Mathematics degree programmes.
- Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24(2), 97-140. <https://doi.org/10.1080/10888691.2018.1537791>
- De Bruijn-Smolters, M., & Prinsen, F. R. (2024). Effective student engagement with blended learning: A systematic review. *Heliyon*, 10(23), e39439. <https://doi.org/10.1016/j.heliyon.2024.e39439>
- Durksen, T. L., Way, J., Bobis, J., Anderson, J., Skilling, K., & Martin, A. J. (2017). Motivation and engagement in Mathematics: A qualitative framework for teacher-student interactions. *Mathematics Education Research Journal*, 29(2), 163-181. <https://doi.org/10.1007/s13394-017-0199-1>
- Everingham, Y. L., Gyuris, E., & Connolly, S. R. (2017). Enhancing student engagement to positively impact Mathematics anxiety, confidence and achievement for interdisciplinary Science subjects. *International Journal of Mathematical Education in Science and Technology*, 48(8), 1153-1165. <https://doi.org/10.1080/0020739X.2017.1305130>
- Flores, L., Tamban, S. B., Lacuarin, V. E., Bando, N. M., & Cortezano, G. P. (2021). Students' engagement and their performances in Mathematics. *Paripex Indian Journal of Research*, 164-167. <https://doi.org/10.36106/paripex/7211471>
- Gopal, K., Salim, N. R., & Ayub, A. F. M. (2018). Influence of self-efficacy and attitudes towards Statistics on undergraduates' Statistics engagement in a Malaysian public university. *Journal of Physics: Conference Series*, 1132, 012042. <https://doi.org/10.1088/1742-6596/1132/1/012042>
- Joshi, D. R., Adhikari, K. P., Khanal, B., Khadka, J., & Belbase, S. (2022). Behavioral, cognitive, emotional and social engagement in mathematics learning during COVID-19 pandemic. *PLOS ONE*, 17(11), e0278052. <https://doi.org/10.1371/journal.pone.0278052>
- Kasimu, O., & Imoro, M. (2017). Students' attitudes towards Mathematics: The case of private and public junior high schools in the east Mamprusi district, Ghana. *IOSR Journal of Research & Method in Education (IOSR-JRME)*, 7(5), 38-43. <https://tinyurl.com/2ytp3i62>
- Kunter, M., Klusmann, U., Baumert, J., Richter, D., Voss, T., & Hachfeld, A. (2013). Professional competence of teachers: Effects on instructional quality and student development. *Journal of Educational Psychology*, 108(5), 805-820. <https://doi.org/10.1037/a0032583>
- Lijie, Z., Zongzhao, M., & Ying, Z. (2020). The influence of Mathematics attitude on academic achievement: Intermediary role of Mathematics learning engagement. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 4(2), 460-467. <https://doi.org/10.31004/cendekia.v4i2.253>
- Llorente, H. M. C., & Tado, P. P. (2024). The mediating effect of problem-based learning on the relationship between technology integration and student engagement in Mathematics. *Asian Journal of Education and Social Studies*, 50(4), 54-69. <https://doi.org/10.9734/ajess/2024/v50i41310>
- Manatad, M. J., & Baluyos, G. (2023). Students' satisfaction and attitudes toward Mathematics in blended learning in relation to performance in Mathematics. *International Journal for Multidisciplinary Research*, 5(6). <https://doi.org/10.36948/ijfmr.2023.v05i06.9367>
- Mazana, M. Y., Montero, C. S., & Casmir, R. O. (2018). Investigating students' attitude towards learning mathematics. *International Electronic Journal of Mathematics Education*, 14(1). <https://doi.org/10.29333/iejme/3997>
- McMullen, J., Bui, P., Brezovszky, B., Lehtinen, E., & Hannula-Sormunen, M. (2023). Mathematical game performance as an indicator of deliberate practice. *International Journal of Serious Games*, 10(4), 113-130. <https://doi.org/10.17083/ijsg.v10i4.634>
- Nayir, K. F. (2015). The relationship between students' engagement level and their attitudes toward school. *The Anthropologist*, 20(1-2), 50-61. <https://doi.org/10.1080/09720073.2015.11891723>

- Peteros, E. D., Benemerito, G. N., Peconcillo Jr, L. B., de Vera, J. V., & Alcantara, G. A. (2022). Investigating the attitudes and performance of retained students in Mathematics: A case of Cebu, Philippines. *Journal of Positive School Psychology*, 6(3), 8692-8704. <https://tinyurl.com/2b9ypebk>
- Poquita, J. K. C. (2023). Self-efficacy and motivation as predictors to Mathematics performance in online learning. *International Journal of Innovative Science and Research Technology*, 8(7). <https://doi.org/10.5281/zenodo.8220992>
- Shi, Y., Peng, F., & Sun, F. (2022). A blended learning model based on smart learning environment to improve college students' information literacy. *IEEE Access*, 10, 89485-89498. <https://doi.org/10.1109/ACCESS.2022.3201105>
- Skilling, K., Bobis, J., & Martin, A. J. (2021). The "ins and outs" of student engagement in Mathematics: Shifts in engagement factors among high and low achievers. *Mathematics Education Research Journal*, 33(3), 469-493. <https://doi.org/10.1007/s13394-020-00313-2>
- Steele, J., Holbeck, R., & Mandernach, J. (2019). Defining effective online pedagogy. *Journal of Instructional Research*, 8(2), 5-8. <https://doi.org/10.9743/jir.2019.8.2.1>
- Stronge, J. H. (2012). Teacher effectiveness performance evaluation system. Stronge & Associates. <https://tinyurl.com/4stf6ab8>
- Stronge, J. H. (2018). *Qualities of effective teachers* (3rd ed.). ASCD. <https://tinyurl.com/mrxt8jwn>
- Torrejos, R. L. (2024). College students' engagement in Mathematics in the modern world: The influential role of perceived teaching performance of instructors and critical thinking skills in a blended learning environment. *European Journal of Contemporary Education and E-Learning*, 2(3), 74-89. [https://doi.org/10.59324/ejceel.2024.2\(3\).07](https://doi.org/10.59324/ejceel.2024.2(3).07)
- Wang, M. T., & Degol, J. L. (2017). Gender gap in STEM: Revisiting the role of social and academic engagement. *Educational Researcher*, 46(5), 223-234. <https://doi.org/10.3102/0013189X17712639>
- Wang, M. T., Hofkens, T., & Ye, F. (2020). Classroom quality and adolescent student engagement and performance in Mathematics: A multi-method and multi-informant approach. *Journal of youth and adolescence*, 49, 1987-2002. <https://doi.org/10.1007/s10964-020-01195-0>
- Xia, Q., Yin, H., Hu, R., Li, X., & Shang, J. (2022). Motivation, engagement, and Mathematics achievement: An exploratory study among Chinese primary students. *SAGE Open*, 12(4), 21582440221134609. <https://doi.org/10.1177/2158244022113460>