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Observed Teaching Practices and Motivation as Predictors of Student Engagement in Mathematics

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Abstract

Purpose: The primary purpose of this study aimed to investigate whether observed teaching practices and motivation significantly predict student engagement in the Bachelor of Secondary Education Major in Mathematics.

Research Methodology: A quantitative descriptive-predictive research design was used, with simple random sampling to select 54 second-year Bachelor of Secondary Education students majoring in Mathematics from Davao del Norte State College. Three validated questionnaires were used to measure these variables. Statistical analyses included the mean, standard deviation, Pearson's correlation coefficient, and multiple regression analysis.

Results: Significant positive relationships were found between teaching practices (r= 0.543) and students' motivation (r=0.658), and student engagement. Both teaching practices (β=0.40) and students' motivation (β=0.49) were significant predictors of student engagement. The adjusted R-squared value of 0.59 indicates that the model explains 59% of the variation in student engagement.

Conclusions: Teaching Practices and student motivation are significant predictors of student engagement among second-year Bachelor of Secondary Education (BSEd) Mathematics students.

Limitations: The study was limited to 54 second-year BSEd Mathematics students from a single institution and used self-reported questionnaire data, which may limit generalizability and overlook other factors affecting students' engagement.

Contributions: This study provides empirical evidence of the predictive role of teaching practices and motivation in student engagement and offers implications for instructional improvement, teacher education, and future mathematics education research.

Keywords: *BSEd in Mathematics Students, Descriptive-Predictive, Motivation, Observed Teaching Practices, Student Engagement*

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1. Introduction

Student engagement is an essential component of learning, reflecting students' affective and cognitive involvement in classroom activities. Engaged students are more likely to develop a deeper understanding, better retention, and stronger connections between academic concepts and real-life situations. However, student engagement remains a concern in education, particularly in mathematics, where many students struggle to participate actively and maintain their interest (Bennett & Boesdorfer, 2020). A study in the United States revealed that 55% of undergraduate students reported difficulty staying engaged, emphasizing the need for strategies and interventions to improve participation (Lawson & Lawson, 2020).

Similar challenges have been observed in Southeast Asia and the Philippines. A study in Kota Kinabalu, Sabah, Malaysia, Yong, Kong, and Albert (2024) found that the average level of student engagement in mathematics was 67.1%, indicating below-average engagement. In the Philippines, a study by Pulmones (2023) reported that the scores of 83 students on the St. Scholastica's College Survey of Student Engagement were categorized as low. In Davao del Norte, Llorente and Tado (2024) reported that the level of engagement among tertiary students in a public university in Davao del Norte decreased by 40% due to the pandemic.

Previous studies examined the relationship between teaching practices, motivation, and student engagement (Anyichie, Butler, & Nashon, 2023). The findings are expected to benefit students, teachers, and school administrators by providing insights to improve teaching strategies, strengthen student motivation, and develop interventions that promote greater engagement in mathematics learning (Chiu, Moorhouse, Chai, & Ismailov, 2023).

2. Literature Review and Hypotheses Development

2.1 Student Engagement

According to Qian and Saidin (2025), student engagement refers to learners actively participating in their education, with higher engagement linked to greater academic success. Student engagement is shaped by positive emotions, behaviors, relationships, abilities, and resources but hindered by limited support and negative behaviors (Li & Xue, 2023). Cognitive engagement, a key indicator of student engagement, develops when students exert effort in critically thinking about solving problems (Huang, Hew, & Lo, 2019). Students' cognitive engagement improves when they actively participate in challenging augmented reality-supported activities, as difficult tasks encourage deeper thinking (Tshering, Dorji, & Jatsho, 2024).

Behavioral engagement is a key indicator of student engagement, reflected in students' visible actions in the educational process, such as participation in class discussions, adherence to school policies, and involvement in academic activities (Nguyen, Cannata, & Miller, 2018). According to Asbar, Mahmud, and Halim (2025), behavioral engagement is shown through active participation, task involvement, and peer interaction. Affective engagement refers to students' emotional responses to the learning process. It involves feelings such as interest, enjoyment, and positive relationships that foster a supportive educational environment (Daher, Sabbah, & Abuzant, 2021).

2.2 Teaching Practices

Uibu, Salo, Ugaste, and Rasku-Puttonen (2023) defined teaching practices as instructional approaches and strategies used in teacher-student classroom interactions. These practices help shape the learning environment and influence students' motivation and achievement (Ucol, 2025). Rollnick and Mavhunga (2016) defined subject matter knowledge as understanding key ideas and concepts within a subject in a clear and meaningful way for learners. Subject Matter Knowledge (SMK) plays a key role in teaching theory and practice and is crucial to teachers' instructional practices (Vereijken & Rijst, 2023).

This refers to an educational approach, method, or classroom plan aimed at achieving specific teaching and learning objectives (Ayua, 2017). Instructional strategies, as part of instructional planning, play a key role in effective content delivery to learners (Karngbeae & Kennedy, 2022). Assessment is defined as the process of planning, collecting, analyzing, and interpreting information to improve learning and show what students know, understand, and can do (Nieminen, 2024). Adhikari, Joshi, Belbase, Sharma, and Khanal (2023) found that assessment strategies are positively correlated with teaching effectiveness, with innovative methods improving engagement and student outcomes. Students perceive the learning environment as significantly affecting their academic achievement and growth. It is defined as all aspects of education that influence students' academic development (Masud, Mensah, Subarna, & Hasan, 2023). Effective communication is the process of conveying information from a source to an audience and ensuring that the message is understood as intended (Mahdi, 2023). It facilitates learning, strengthens relationships, and promotes a positive learning environment (Saptono & Matondang, 2023).

2.3 Motivation

In the educational context, motivation significantly influences learners' performance. Students with strong motivation are more likely to exert greater effort to achieve their goals and actively engage in learning (Campanilla, 2024). Hence, motivation is a psychological process that guides, initiates, and sustains goal-directed behavior and engagement (Saadon, Ahmad, & Hanapi, 2020). Intrinsic motivation is defined as the pleasure felt from an activity and the anticipated enjoyment before making a decision (Delos Santos et al., 2026). It is influenced by engagement and plays a mediating role in strengthening the relationship between various factors and performance outcomes (Kotera, Taylor, Fido, Williams, & Tsuda-McCaie, 2023).

Self-regulation is the intentional and conscious process that students use to manage their learning motivation, including goal setting, progress tracking, and strategy adjustment when needed. Students who can regulate their learning are more likely to remain motivated and engaged in their study. Self-efficacy is a person's confidence in their ability to perform a task in a specific situation, based on self-evaluation (Waddington, 2023). Students with high self-efficacy are more likely to engage in academic activities to develop their skills and abilities (Bhati & Sethy, 2022).

Alberts, Beymer, Phun, and Schmidt (2022) define utility value as the perceived usefulness of a task or subject in achieving present and future goals. Research has shown that utility value interventions encourage students to make meaningful connections, increasing their motivation and engagement in class (Goto, 2024). Hafezi and Etemadi (2022) defined test anxiety as negative emotional and cognitive experiences during high-stakes assessments, including self-talk, fear of failure, and physical symptoms such as increased heart rate. A moderate level of test anxiety may motivate students to prepare and engage in learning, while excessive anxiety can hinder concentration and performance (Wadi, Yusoff, Rahim, & Lah, 2022).

2.4 Teaching Practices and Student Engagement

Garcia (2022) found a strong correlation between teaching practices and student engagement, stating that higher engagement in affective liking for learning, school liking, and cognitive engagement is linked to better teaching practices. Similarly, encouragement, praise, and reminders significantly improved student engagement.

2.5 Motivation and Student Engagement

Ferrer, Ringer, Saville, A Parris, and Kashi (2022) state that motivation and engagement are closely related, with motivation leading to engagement. According to Martin, Ginns, and Papworth (2017), motivation and engagement are strong academic behaviors that support student learning achievement.

2.6 Hypotheses Development

The following hypotheses were used as the basis for further investigation at the $\alpha = 0.05$ level of significance:

- H_1: There is no significant relationship between the teaching practices and student engagement in mathematics
- H_2: There is no significant relationship between motivation and student engagement in mathematics
- H_3: Teaching practices and motivation do not significantly predict student engagement in mathematics

3. Methodology

3.1 Research Design

This study used a quantitative descriptive predictive research design to examine teaching practices and motivation as predictors of student engagement in mathematics. Afriyani, Indrayani, Indrawan, Wibisono, and Ngaliman (2023) defined quantitative research as a method used to test theories, examine relationships among variables, provide statistical explanations, and predict outcomes. Descriptive studies aim to describe people, conditions, or events by observing them in their natural state without manipulating any variables, as the researcher only describes the variables and sample (Siedlecki, 2020).

Correlational or predictive research is a non-experimental design used to predict and determine the relationship between variables (Seeram, 2019). A predictive research design was used to identify factors that can predict future outcomes (Kamper, 2020).

3.2 Research Respondents

The respondents of the study were second-year Bachelor of Secondary Education majoring in Mathematics at Davao del Norte State College in Panabo City, Davao del Norte, enrolled in the school year 2024-2025. A total of 62 students were enrolled, with 31 in Set A and 31 in Set B. Of these, 54 were selected as respondents using the Raosoft sample size calculator, with a 95% confidence level (Z-score = 1.96) and 5% margin of error. The sample size was considered sufficient to represent the population and to support the correlational and regression analyses. A simple random sampling technique was used to select the 54 student respondents, ensuring that all students in the course had an equal chance of being included in the sample. According to Noor, Tajik, and Golzar (2022), simple random sampling is appropriate for relatively homogeneous groups where participants are randomly selected to take part in the study. It was deemed suitable for this research because all respondents were second-year Bachelor of Secondary Education students majoring in Mathematics. This method helped minimize selection bias and ensured equal chances of inclusion, thereby improving the sample representativeness. The fishbowl method was used to randomly select respondents.

3.3 Research Instruments

To measure effective teaching practices observed by students, the researchers adapted the School Teacher Effectiveness Questionnaire (STEQ) from (Akram, 2018). The instrument used a 5-point Likert scale: 1 - Never, 2 - Rarely, 3 - Sometimes, 4 - Often, and 5 - Always. The STEQ consisted of 26 items across five indicators: subject matter knowledge (six), instructional planning and strategies (six), assessment (five), learning environment (six), and effective communication (three). The instrument showed excellent reliability, with a Cronbach's alpha of 0.90, indicating that it was reliable for data collection, as can be seen in Table 1.

Table 1. Observed teaching practices parameters

Parameter Limits	Descriptive Equivalent	Interpretation
4.20 - 5.00	Very High	This means that the teaching practices are always observed
3.40 - 4.19	High	This means that the teaching practices are often observed
2.60 - 3.39	Moderate	This means that the teaching practices are sometimes observed
1.80 - 2.59	Low	This means that the teaching practices are rarely observed
1.00 - 1.79	Very Low	This means that the teaching practices are never observed

To measure motivation, the Mathematics Motivation Questionnaire (MMQ) was adapted from Fiorella et al. (2021), used by Lumbantoruan (2024) for university students. The instrument consisted of 19 items across five indicators: intrinsic value (three items), self-regulation (4), self-efficacy (4), utility value (4), and test anxiety (4). A 5-point Likert scale was used, with 5 - Always, 4 - Usually, 3 - Sometimes, 2 - Rarely, and 1 - Never. The instrument showed excellent reliability, with a Cronbach's alpha of 0.91, indicating that it was reliable for data collection, as can be seen in Table 2.

Table 2. Mathematics motivation parameters

Parameter Limits	Descriptive Equivalent	Interpretation
4.20 - 5.00	Very High	This means that the students are very highly motivated to learn mathematics
3.40 - 4.19	High	This means that the students are highly motivated to learn mathematics
2.60 - 3.39	Moderate	This means that the students are moderately motivated to learn mathematics

1.80 - 2.59	Low	This means that the students are less motivated to learn mathematics
1.00 - 1.79	Very Low	This means that the students are least motivated to learn mathematics

The instrument for student engagement was adapted from the Student Engagement in the Mathematics Classroom Questionnaire (SEMCQ) (Maamin, Maat, & Iksan, 2021). A 5-point Likert scale was used as the response option for each question. The instrument consisted of 21 items across three indicators: cognitive engagement (9 items), behavioral engagement (6 items), and affective engagement (6 items). After pilot testing, the instrument showed excellent reliability, with a Cronbach's alpha of 0.93, indicating that it was reliable for data collection, as can be seen in Table 3.

Table 3. Student engagement parameters

Parameter Limits	Descriptive Equivalent	Interpretation
4.20 - 5.00	Very High	This means that the student engagement in mathematics is consistent
3.40 - 4.19	High	This means that the student engagement in mathematics is frequent
2.60 - 3.39	Moderate	This means that the student engagement in mathematics is occasional
1.80 - 2.59	Low	This means that the student engagement in mathematics is infrequent
1.00 - 1.79	Very Low	This means that the student engagement in mathematics is minimal

4. Results and Discussions

4.1 Extent of Teaching Practices in terms of Subject Matter Knowledge in Mathematics

Table 4 shows the extent of teaching practices in terms of subject matter knowledge. The item "My teacher teaches content through a variety of teaching skills" obtained the highest mean score of 4.57, followed by "My teacher demonstrates accurate subject matter knowledge" (mean score = 4.46). The item with the lowest mean score of 4.24 was "My teacher explains the content according to my intellectual, physical, and social needs." Overall, the category mean was 4.41 with an SD of 0.49, interpreted as very high, indicating that students consistently perceive strong subject matter competence among the teachers.

Table 4. Extent of teaching practices in terms of subject matter knowledge in mathematics

Statement	Mean	SD	Descriptive Equivalent
My teacher demonstrates accurate knowledge according to subject matter while teaching	4.46	0.57	Very High
My teacher links present content with past and future learning experiences	4.43	0.63	Very High
My teacher teaches content through a variety of teaching skills	4.57	0.54	Very High
My teacher makes the subject matter accessible to me	4.31	0.67	Very High
My teacher links the content with practical life	4.43	0.63	Very High
My teacher explains the content according to my intellectual, physical, and social needs	4.24	0.70	Very High
Category Mean	**4.41**	**0.49**	**Very High**

The findings suggest that teachers with strong content mastery can support deeper understanding and present lessons that facilitate meaningful learning experiences among students. This reinforces the idea that teachers confident in their subject expertise are more capable of delivering structured and engaging instruction. This is supported by Guerriero (2017), who emphasized that teachers with high subject matter knowledge can transform their expertise into effective teaching practices that improve student learning outcomes.

4.2 Extent of Teaching Practices in terms of Instructional Planning and Strategies in Mathematics

Table 5 presents the results of teaching practices in terms of instructional planning and strategy. The item with the highest mean score of 4.50 was "My teacher teaches students according to their individual

differences," with a descriptive equivalent of very high. Meanwhile, the item "My teacher changes his/her teaching methodology to make topics relevant to students' lives" received the lowest mean score of 4.06, with a descriptive equivalent of high. Moreover, teaching practices in terms of instructional planning and strategies obtained a category mean of 4.34 with a standard deviation of 0.54, indicating a very high rating by students. This suggests that teachers are perceived as effective in planning lessons and using varied strategies to support students' learning.

Table 5. Extent of teaching practices in terms of instructional planning and strategies in mathematics

Statement	Mean	SD	Descriptive Equivalent
My teacher demonstrates accurate knowledge according to subject matter while teaching	4.31	0.72	Very High
My teacher uses different teaching strategies to enhance students' understanding	4.39	0.74	Very High
My teacher changes his/her teaching methodology to make topics relevant to students' lives	4.06	0.81	High
My teacher teaches the students according to their individual differences	4.50	0.64	Very High
My teacher uses the appropriate material, technology and resources while teaching	4.39	0.66	Very High
My teacher engages, motivates, and maintains students' attention to their lesson	4.39	0.60	Very High
Category Mean	**4.34**	**0.54**	**Very High**

The results indicate that teachers effectively plan and implement instructional strategies that consider individual differences among learners. This is supported by Taş and Minaz (2024), who state that when teachers tailor learning activities to accommodate varied learning styles, they create more engaging discussions.

4.3 Extent of Teaching Practices in terms of Assessment in Mathematics

Table 6 presents the results of teaching practices in terms of assessments. The items "My teacher maintains a record of students' results" and "My teacher encourages students to do better next time" both obtained a mean score of 4.33 with a descriptive equivalent of very high. Meanwhile, the item "My teacher evaluates students and provides timely feedback on their errors" garnered the lowest mean score of 4.24, with a descriptive equivalent of very high. Moreover, teaching practices in terms of assessment obtained a category mean of 4.30, with a descriptive equivalent of very high and a standard deviation of 0.56, suggesting that students perceived their teachers as highly effective in implementing assessment strategies that support learning, with low to moderate variability in responses.

Table 6. Extent of teaching practices in terms of assessment in mathematics

Statement	Mean	SD	Descriptive Equivalent
My teacher conducts class tests to monitor students' performance regularly	4.26	0.62	Very High
My teacher evaluates students' performance and provides timely feedback on their errors	4.24	0.70	Very High
My teacher maintains a record of students' results	4.33	0.73	Very High
My teacher uses multiple assessment strategies	4.31	0.72	Very High
My teacher encourages the students to do better next time	4.33	0.80	Very High
Category Mean	**4.30**	**0.56**	**Very High**

The results indicate that assessment practices are consistently implemented and support student learning. However, the slightly lower rating for feedback suggests that improving the timeliness and depth of feedback may enhance learning outcomes. Effective assessment not only monitors progress but also guides students toward improvement. This is supported by Näsström, Andersson, Granberg, Palm, and Palmberg (2021), who found that formative assessment enhances student motivation by allowing teachers to adjust instruction based on ongoing feedback.

4.4 Extent of Teaching Practices in terms of Learning Environment in Mathematics

Table 7 presents the results of teaching practices in terms of creating conducive learning environments. The item "My teacher emphasizes continuous improvement toward student achievement" received the highest mean score of 4.46, with a descriptive equivalent of very high. Meanwhile, the items "My teacher creates an attractive and friendly classroom environment" and "My teacher ensures that lower-achieving students have opportunities to be successful" both obtained the lowest mean scores of 4.20, with a descriptive equivalent of high. Furthermore, teaching practices in terms of the learning environment obtained a category mean of 4.30, with a descriptive equivalent of very high, suggesting that students perceived the classroom setting as highly supportive and structured for learning. The standard deviation of 0.60 indicates low-to-moderate variability in students' perceptions.

Table 7. Extent of teaching practices in terms of learning environment in mathematics

Statement	Mean	SD	Descriptive Equivalent
My teacher creates a climate of mutual trust and respect in the classroom	4.39	0.60	Very High
My teacher emphasizes continuous improvement towards students' achievement	4.46	0.64	Very High
My teacher maintains a classroom setting that minimizes disruption	4.26	0.68	Very High
My teacher creates an attractive and friendly classroom environment	4.20	0.81	High
My teacher ensures students' participation in the learning process	4.30	0.82	Very High
My teacher ensures that lower-achievement students have opportunities to be successful	4.20	0.88	High
Category Mean	**4.30**	**0.60**	**Very High**

The results suggest that teachers create a supportive and structured learning environment. However, ensuring inclusivity and enhancing the classroom atmosphere remain areas for improvement. A positive learning environment is essential for fostering student participation, motivation, and academic success. This is supported by Goagoses et al. (2024), who found that a positive social classroom climate enhances student well-being, motivation, and achievement.

4.5 Extent of Teaching Practices in terms of Effective Communication in Mathematics

Table 8 presents the data on teaching practices regarding effective communication. The items "My teacher uses appropriate language and methods while teaching" and "My teacher explains the guidelines clearly and simply" both received the highest mean score of 4.52. Meanwhile, the item "My teacher uses a clear voice while teaching" obtained the lowest mean score of 4.39, with a descriptive equivalent of very high. Teaching practices in terms of effective communication achieved a category mean of 4.47, with a very high descriptive equivalent. The standard deviation of 0.56 suggests low-to-moderate variability in students' responses. This indicates that students consistently perceive their teachers as demonstrating strong communication skills in the classroom and implies a shared perception of teachers' communication effectiveness in the classroom.

Table 8. Extent of teaching practices in terms of effective communication in mathematics

Statement	Mean	SD	Descriptive Equivalent
My teacher uses correct vocabulary and grammar in teaching	4.48	0.67	Very high
My teacher explains lessons according to the age and ability of the students	4.43	0.66	Very High
My teacher responds to students' questions in appropriate language	4.46	0.61	Very High
My teacher uses appropriate language and methods while teaching	4.52	0.61	Very High
My teacher uses a clear voice while teaching	4.39	0.86	Very High

My teacher explains the guidelines clearly and simply	4.52	0.72	Very High
Category Mean	**4.47**	**0.56**	**Very High**

The results show that teachers exhibit strong communication skills that facilitate understanding and engagement. A clear explanation and appropriate language contribute significantly to effective teaching. Strong communication fosters better interaction and supports students' confidence in learning mathematics. This is supported by Khaliq, Raza, and Ajmal (2025), who emphasized that teachers with strong verbal and written communication skills enhance classroom management and reported that clear instructions, timely feedback, and approachable communication significantly increase student engagement and academic achievement.

4.6 Summary of the Extent of Teaching Practices in Mathematics

Table 9 presents the students' observations of teaching practices across five indicators. All indicators received a very high rating, with an overall mean of 4.36 and a standard deviation, indicating consistently strong teaching practice. Effective Communication had the highest mean score of 4.47, followed by Subject Matter Knowledge with a mean of 4.41. Instructional Planning and Strategies obtained a mean of 4.33, while Assessment and Learning Environment received a mean of 4.30. This indicates that students perceive their teachers as proficient in using assessments to support learning and create structured, supportive classroom environments.

Table 9. Summary of the extent of teaching practices in mathematics

Indicators	Mean	SD	Descriptive Equivalent
Subject Matter Knowledge	4.41	0.49	Very High
Instructional Planning and Strategies	4.33	0.54	Very High
Assessment	4.30	0.56	Very High
Learning Environment	4.30	0.60	Very High
Effective Communication	4.47	0.56	Very High
Overall	**4.36**	**0.43**	**Very High**

The results indicate that students' perception of their teachers fostering a positive learning environment corresponds to clear and effective communication that facilitates a wide range of positive academic outcomes for students (Xie & Derakhshan, 2021). On the other hand, teachers' proficiency in their subject matter is a crucial part for effective instruction and student learning (Suyatno, Jumintono, Pambudi, Mardati, & Wantini, 2019). Moreover, teachers that have a strong subject matter knowledge employ varied instructional strategies that positively affect the level of engagement and the learning outcomes of the students (Heilporn, Lakhal, & Bélisle, 2021).

4.7 Level of Motivation in terms of Intrinsic Value of Students

Table 10 presents the data on motivation in terms of intrinsic values. The item "Understanding math gives me a sense of accomplishment" obtained the highest mean score of 4.24, which was described as very high. Meanwhile, the items "I enjoy learning math" and "I like math that challenges me" both obtained the lowest mean score of 3.81, which was described as high. Overall, motivation in terms of intrinsic value obtained a category mean of 3.94 and a standard deviation of 0.76, interpreted as high. This indicates that students are highly motivated to learn mathematics and that there is a moderate variation in their perceptions of the intrinsic value of learning mathematics

Table 10. Level of motivation in terms of intrinsic value of students

Statement	Mean	SD	Descriptive Equivalent
I enjoy learning math	3.81	0.91	High
I find learning math interesting	3.90	0.91	High
I like math that challenges me	3.81	0.99	High
Understanding math gives me a sense of accomplishment	4.24	0.75	Very High
Category Mean	**3.94**	**0.76**	**High**

The results indicate that students generally find mathematics meaningful, although enjoyment and appreciation of challenge are slightly lower. This suggests the need to design engaging and stimulating learning experiences to strengthen students' intrinsic motivation. This is supported by (Adamma, Ekwutosim, & Unamba, 2018), who highlighted that intrinsic value strongly contributes to student engagement and learning effectiveness, suggesting that it fosters students' motivation to learn mathematics.

4.8 Level of Motivation in terms of Self-regulation of Students

Table 11 presents the data on motivation in terms of Self-Regulation (SR). The items "I put enough effort into learning math" and "If I am having trouble learning math, I try to figure out why" obtained the highest mean score of 4.03, which was described as high. Meanwhile, the item "I prepare well for math tests and quizzes" obtained the lowest mean score of 3.92, which is also described as high. Overall, motivation in terms of self-regulation obtained a category mean of 4.00, which was described as high, indicating that students were highly motivated to learn mathematics. Moreover, the standard deviation of 0.62 indicates a moderate variation in students' perceptions of their self-regulation in learning math.

Table 11. Level of Motivation in terms of self-regulation of students

Statement	Mean	SD	Descriptive Equivalent
I put enough effort into learning math	4.03	0.75	High
If I am having trouble learning math, I try to figure out why	4.03	0.72	High
I use strategies that ensure I learn math well	4.00	0.77	High
I prepare well for math tests and quizzes	3.92	0.82	High
Category Mean	**4.00**	**0.62**	**High**

The results show that students demonstrate good self-regulation skills, particularly in terms of effort and persistence. However, strengthening their preparation habits may further improve their academic performance. This is supported by Inzlicht, Werner, Briskin, and Roberts (2021) who highlighted that self-regulation enables individuals to stay focused, overcome challenges, and achieve personal and academic goals. In the context of education, this means that students who can manage their thoughts, behaviors, and emotions are better equipped to stay focused, overcome challenges, and achieve academic success.

4.9 Level of Motivation in terms of Self-efficacy of Students

Table 12 presents the data on motivation in terms of Self-Efficacy (SE). The item "I am confident I will do well on math assignments and projects" obtained the highest mean score of 3.77, which was described as high. Meanwhile, the item "I am confident I will achieve a grade 'A' in the math course" obtained the lowest mean score of 3.44, which was also described as high. Overall, motivation in terms of self-efficacy obtained a category mean of 3.62, which was described as high, indicating that students were highly motivated to learn mathematics. Furthermore, the standard deviation of 0.77 indicates a moderate variation in students' perceptions of self-efficacy.

Table 12. Level of motivation in terms of self-efficacy of students

Statement	Mean	SD	Descriptive Equivalent
I am confident I will do well on math assignments and projects	3.77	0.76	High
I am confident I will do well on math tests	3.66	0.77	High
I am confident I will achieve a grade "A" in the math course	3.44	1.00	High
Category Mean	**3.62**	**0.77**	**High**

The results indicate that students generally believe in their ability to succeed, although some lack strong confidence. Enhancing self-efficacy can improve students' engagement and persistence in learning. This is supported by Hayat, Shateri, Amini, and Shokrpour (2020), who found that students with higher

self-efficacy participate more actively, seek help when needed, and benefit from instructional strategies that strengthen confidence.

4.10 Level of motivation in terms of utility value of students

Table 13 presents the data on motivation in terms of the utility value. The item "I think about how learning math can help me get a good job" obtained the highest mean score of 4.16, which was described as high. Meanwhile, the item "I think about how the math I learn will be helpful to me" obtained the lowest mean score of 4.03, which was also described as high. Overall, motivation in terms of utility value obtained a category mean of 4.09, which was described as high, indicating that students are highly motivated to learn mathematics because they recognize its practical value. Furthermore, the standard deviation of 0.74 indicates a moderate variation in students' perceptions of mathematics usefulness.

Table 13. Level of motivation in terms of utility value of students

Statement	Mean	SD	Descriptive Equivalent
I think about how the math I learn will be helpful to me	4.03	0.80	High
I think about how I will use the math I learn	4.05	0.81	High
I think about how learning math can help me get a good job	4.16	0.79	High
I think about how learning math can help my career	4.12	0.80	High
Category Mean	**4.09**	**0.74**	**High**

This finding implies that students view mathematics as important and useful, which enhances their motivation and engagement, although some are less convinced. This is supported by Silverman, Hulleman, and Tibbetts (2023), who found that utility value interventions increase motivation and performance by helping students connect classroom material to their personal lives. When students perceive a task as valuable, they are more likely to invest effort and persist in their learning.

4.11 Level of Motivation in terms of Test Anxiety of Students

Table 14 presents the data on motivation regarding test anxiety. The item "I worry about failing math tests" obtained the highest mean score of 4.40, which was described as very high. Meanwhile, the item "I am concerned that other students are better in math" obtained the lowest mean score of 3.87, which was described as high. Overall, motivation in terms of test anxiety obtained a category mean of 4.20, which was described as very high, indicating that students were highly motivated to learn mathematics. The standard deviation of 0.62 indicates that test anxiety motivates students. However, teachers should create a supportive environment to reduce excessive stress.

Table 14. Level of motivation in terms of test anxiety of students

Statement	Mean	SD	Descriptive Equivalent
I become anxious when it is time to take a math test	4.14	0.83	High
I am nervous about how I will do on the math tests	4.38	0.68	Very High
I worry about failing math tests	4.40	0.85	Very High
I am concerned that the other students are better in math	3.87	1.02	High
Category Mean	**4.20**	**0.62**	**Very High**

The results show that students are highly motivated regardless of test anxiety. Balogun, Balogun, and Onyencho (2017) suggested that students with higher motivation may still perform well despite their anxiety levels. Likewise, experiencing a low to moderate degree of test anxiety can actually be helpful for students, as it may drive them to work harder, motivate them, and keep them focused on achieving strong academic results (Rehman, Javed, & Abiodullah, 2021).

4.12 Summary of the Level of Motivation of Students in Mathematics

Table 15 presents the data on students' overall motivation across various components. Among the indicators, test anxiety obtained the highest mean score of 4.20, with a descriptive equivalent of very high, indicating that fear of failing tests strongly influences students' efforts in mathematics. This suggests that assessments play a major role in encouraging students to study and perform well.

Meanwhile, self-efficacy obtained the lowest mean score of 3.62, with a high descriptive equivalent, indicating that some students are less confident in their ability to succeed in mathematics, although their motivation remains high. The overall category mean of 3.97 indicates that students were consistently motivated by these factors. The standard deviation of 0.52 indicates consistency in students' responses. Overall, the findings suggest that while students are highly motivated, improving their confidence in mathematics could further strengthen their learning results.

Table 15. Summary of the level of motivation of students in mathematics

Indicators	Mean	SD	Descriptive Equivalent
Intrinsic Value	3.94	0.76	High
Self-regulation	4.00	0.62	High
Self-efficacy	3.62	0.77	High
Utility Value	4.09	0.74	High
Test Anxiety	4.20	0.62	Very High
Overall	**3.97**	**0.52**	**High**

The results indicate that students are highly motivated, which supports engagement and learning. Filgona, Sakiyo, Gwany, and Okoronka (2020), emphasized that motivation is a crucial component required for high-quality education. Likewise, motivation is also crucial since it explains the students' engagement and academic achievement (Vanslambrouck, Zhu, Lombaerts, Philipsen, & Tondeur, 2018).

4.13 Level of Engagement in terms of Cognitive Engagement of Students

Table 16 presents data on cognitive engagement. The item "I learn mathematics based on what the teacher teaches" obtained the highest mean score of 4.30, which was described as very high. Meanwhile, the item "I relate what I learn in mathematics to real-life situations" obtained the lowest mean score of 4.00, which was described as high. Overall, cognitive engagement obtained a category mean of 4.15, with a descriptive equivalent of high, indicating that students frequently demonstrate cognitive engagement. The standard deviation of 0.49 indicates moderate variability. This suggests that strengthening real-life applications may further enhance students' understanding of the subject.

Table 16. Level of Engagement in terms of Cognitive Engagement of Students

Statement	Mean	SD	Descriptive Equivalent
I relate the things I learn in mathematics to the things I go through in real life	4.00	0.73	High
I relate the things I learn in mathematics to other subjects	4.04	0.75	High
I think about the things I have learned when I learn new things in mathematics	4.13	0.64	High
I prefer to memorize all the formulas necessary to solve mathematics problems	4.10	0.71	High
I find memorizing formulas is the best technique for learning mathematics	4.17	0.72	High
I think the best way to learn mathematics is to try to do drills	4.28	0.71	Very High
I learn mathematics based on what the teacher teaches	4.30	0.63	Very High
I solve mathematics problems in the same way taught by the teacher	4.22	0.74	Very High
I think the best way to learn mathematics is to follow the teacher's instructions	4.11	0.71	High
Category Mean	**4.15**	**0.49**	**High**

The results imply that students often understand and solve math problems by following the teacher's methods and believe that practicing drills and memorizing formulas are effective ways to learn

mathematics. Vale and Barbosa (2023) suggests that active learning strategies, particularly repetitive exercises, promote deeper cognitive engagement and enhance students' problem-solving abilities in mathematics.

4.14 Level of Engagement in terms of Behavioral Engagement of Students

Table 17 presents data on student engagement in terms of behavioral engagement. The item "I listen to the mathematics teacher's instructions attentively" obtained the highest mean score of 4.28, with a descriptive equivalent of very high, indicating that students are highly attentive during lessons. Meanwhile, the item "I participate in discussions during mathematics learning" obtained the lowest mean score of 3.76 with a descriptive equivalent of high, indicating lower participation compared to listening to others. Furthermore, behavioral engagement obtained a category mean of 4.05 with a descriptive equivalent of high, indicating that students frequently demonstrate behavioral engagement in their learning. The standard deviation of 0.78 indicates moderate variability in behavioral engagement. Overall, the findings suggest that while students are attentive in class, increasing their active participation in discussions may further strengthen their engagement in mathematics learning.

Table 17. Level of engagement in terms of behavioral engagement of students

Statement	Mean	SD	Descriptive Equivalent
I listen to the mathematics teacher's instructions attentively	4.28	0.72	Very High
I participate in discussions during mathematics learning	3.76	0.75	High
I participate in discussions during mathematics learning	4.17	0.64	High
I am sure I will get the right answer if I keep trying to solve mathematics problems	4.06	0.70	High
I try to use a different method if I continue to not be able to solve the mathematics problem	4.02	0.72	High
I try to understand if there is a problem in mathematics	4.07	0.71	Very High
Category Mean	**4.06**	**0.78**	**High**

The results show that students' attentiveness reflects high behavioral engagement in the classroom. According to Goldberg et al. (2021), attentive behavior shows students' efforts to follow rules and stay focused on learning mathematics. Attentive students are more likely to understand instructions, participate in activities, and achieve better academic results.

4.15 Level of Engagement in terms of Affective Engagement of Students

Table 18 presents data on student engagement in terms of affective engagement. The item "I feel happy when I get good results in mathematics" obtained the highest mean score of 4.51, with a descriptive equivalent of very high, indicating strong positive feelings toward achievement in mathematics. Meanwhile, the item "I do not feel bored in Math class" obtained the lowest mean score of 3.75 with a descriptive equivalent of high, indicating that some students still experience boredom during lessons. The level of affective engagement obtained a category mean of 4.09, with a descriptive equivalent of high, indicating that students demonstrate affective engagement in learning. The standard deviation of 0.56 indicates moderate variability in affective engagement. Overall, the findings suggest that while students generally have positive feelings toward mathematics, improving classroom activities may help to sustain interest and reduce boredom.

Table 18. Level of engagement in terms of affective engagement of students

Statement	Mean	SD	Descriptive Equivalent
I am happy to learn mathematics	4.02	0.83	High
I enjoy learning mathematics	3.78	1.00	High
I feel happy when I get good results in mathematics	4.52	0.57	Very High

I must work hard to get good results in mathematics	4.33	0.75	High
I like the feeling when I am solving problems in Math	4.10	0.76	High
I am helping my classmates in solving Math problems whenever they have difficulties	3.78	0.83	High
I am sharing my ideas and notes to my classmates in Math class	4.11	0.86	High
I am trying my best not to be absent in Math class	4.22	0.84	High
I am happy that my teacher in Math encourages me to be involved in the class	4.00	0.85	High
I am glad that my classmates are willing to help me in answering Math problems	4.44	0.69	High
I enjoyed the activities in our Math class	4.07	0.89	High
I do not feel bored in Math class	3.72	1.14	High
Category Mean	**4.09**	**0.53**	**High**

The results show that students work hard to achieve good results in mathematics and feel happy when their efforts lead to good grades. They also appreciated the support of classmates who helped them understand and solve math problems. According to Jia (2022), positive emotions such as enjoyment and interest motivate students to stay engaged and put more effort into learning mathematics.

4.16 Summary of the Level of Student Engagement in Mathematics

Table 19 presents the data on student engagement. All indicators had a high descriptive equivalent, indicating that engagement is generally frequent. The results also showed moderate variability, suggesting differences in the frequency with which students exhibit engagement. Cognitive engagement obtained the highest mean score of 4.15, with a standard deviation of 0.49, indicating that students were highly engaged in understanding and processing mathematical concepts. Behavioral engagement obtained the lowest mean score of 4.06, with a standard deviation of 0.58, indicating lower classroom participation. However, opportunities remain to encourage greater involvement in discussions and classroom interaction. Overall, students are generally well engaged in mathematics, with cognitive engagement being the strongest aspect.

Table 19. Summary of the level of student engagement in mathematics

Indicators	Mean	SD	Descriptive Equivalent
Cognitive Engagement	4.15	0.49267	High
Behavioral Engagement	4.06	0.57568	High
Affective Engagement	4.09	0.56641	High
Overall	**4.10**	**0.46105**	**High**

The results indicates that 2nd-year students are consistently engaged in learning, particularly in cognitive activities. This aligns with the work of Kahu and Nelson (2018), who emphasized that students' engagement in mathematics is significantly high when learners are encouraged to participate actively in their learning process.

4.17 Correlation of Teaching Practices and Students' Motivation to Students' Engagement in Mathematics

Table 20. Correlation of teaching practices and students' motivation to students' engagement in Mathematics

Variables Correlated	r-value	p-value	Decision on H_0	Interpretation
Teaching Practices and Student Engagement in Mathematics	0.543	0.000	Reject H_0	Significant
Motivation and Student Engagement in Mathematics	0.658	0.000	Reject H_0	Significant

The finding of a significant relationship between teaching practices and students' engagement is supported by Harbour, Evanovich, Sweigart, and Hughes (2015), who state that effective teaching practices increase student engagement. Furthermore, the relationship between students' motivation and engagement is supported by Chiu et al. (2023), who emphasized that motivation is a key driver of active engagement in learning.

4.18 Regression Analysis on Teaching Practices and Motivation to the Student Engagement in Mathematics, n=54

Table 21. Regression analysis on teaching practices and motivation to the student engagement in mathematics, n=54

Independent Variables	**Unstandardized Coefficients**		**Standardized Coefficient**	**t Stat**	**p-value**	**Decision**	**Interpretation**
	Standard Error	**β**	**Beta**				
Constant	0.56	0.43	-	1.31	0.20	-	-
Teaching Practices	0.42	0.11	0.40	3.75	0.00	Reject H₀	Significant
Motivation	0.46	0.09	0.49	4.60	0.00	Reject H₀	Significant
Dependent Variable: Student Engagement							**Adjusted R^2:**0.59
F-Ratio: 30.16.				**p-value:** 0.000			

Table 21 presents the regression analysis of how motivation and teaching practices influence the engagement of students in mathematics. The model explains 59% of the variance in engagement, indicating a good fit, with an overall F-ratio of 30.16, confirming statistical significance. Both student motivation and teaching practices showed strong independent effects, suggesting that higher motivation and effective teaching practices increase engagement. The final model is expressed as follows:

$$SE= TP\ (0.42) +M\ (0.46) +0.56+E \quad (1)$$

The equation shows that Student Engagement (SE) is predicted by teaching practices and motivation, weighted by 0.42 and 0.46, respectively, with a constant of 0.56 and an error term accounting for the variation. A one-unit increase in teaching practices increased student engagement by 0.42 units, whereas a one-unit increase in motivation increased it by 0.46 units. The t-values for teaching practices (3.75) and motivation (4.60), with p = 0.000 for both, confirm their significant contributions to the model. Thus, higher teaching practices and motivation are associated with greater student engagement, leading to the rejection of the null hypothesis.

Xiong (2025) reported that teaching practices and styles enhance the student engagement. Singh, James, Paul, and Bolar (2022) found that motivation positively influences engagement, emphasizing strategies that foster student motivation. Similarly, Cents-Boonstra, Lichtwarck-Aschoff, Denessen, Aelterman, and Haerens (2021) showed that supportive teaching practices, such as structured activities and relatedness, boost engagement. Liu, Ma, and Chen (2024) further highlighted that both teaching practices and motivation are key to achieving high engagement levels.

5. Conclusions

5.1 Conclusion

The findings indicate that teaching practices are high, particularly in communication, subject matter knowledge, and instructional planning, while learning environment and assessment are comparatively lower but still high. Student motivation is also high, especially in terms of test anxiety, utility value, self-regulation, and intrinsic value, while self-efficacy is lower. Student engagement among second-year BSEd Mathematics students was high, with cognitive engagement being the most evident. Furthermore, teaching practices and motivation were found to be significant predictors of student engagement in mathematics. The findings imply that effective teaching practices, particularly

communication, subject-matter knowledge, and instructional planning, enhance student engagement in mathematics. The significant influence of teaching practices and motivation suggests that classroom interventions should prioritize instructional quality and the motivation of students. Teachers may use student-centered activities, formative assessments, collaborative problem solving, and differentiated instruction to improve engagement. In addition, strategies that strengthen self-efficacy and reduce test anxiety, such as constructive feedback, goal setting, and supportive classroom environments, may further promote engagement in mathematics learning. The results may also guide teacher preparation programs and curriculum planners in developing practices that support motivation and engagement among future mathematics educators.

5.2 Research Limitations

The study has several limitations that should be considered when interpreting the findings. First, the sample size may not be sufficiently large or diverse to allow for generalization of the results to different populations. Second, the use of self-reported questionnaire data may limit the accuracy of the findings, as it may overlook contextual or external factors that could also influence student engagement. Third, the relatively short data collection period may not adequately capture the long-term effects of student engagement over time.

5.3 Suggestions and Direction for Future Research

In light of the study's findings, several suggestions for future research are proposed. Future studies may examine the effectiveness of student-centered teaching strategies, assessment methods, and communication patterns in enhancing student engagement. It is also recommended to investigate instructional approaches that can strengthen students' intrinsic motivation, such as real-life applications, collaborative learning activities, and goal-setting practices. Furthermore, research may explore the impact of professional development programs on improving teaching practices and their subsequent influence on student engagement. In addition, the effects of motivation support programs, including mentorship, counseling, and recognition systems, on students' self-efficacy and engagement should be further studied. Finally, future research should consider other relevant factors that may affect student engagement, such as parental involvement, peer influence, and the integration of technology in mathematics learning.

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Author Contributions

RMMN, KJM, ZJC, and AJ contributed to all phases of the research, including conceptualization, design, methodology, data collection, analyses, and interpretation. AES provided the guidance and feedback. All authors have reviewed, revised, and approved the final manuscript.

References

Adamma, O. N., Ekwutosim, O. P., & Unamba, E. C. (2018). Influence of extrinsic and intrinsic motivation on pupils academic performance in mathematics. *Online Submission, 2*(2), 52-59. doi:https://doi.org/10.35706/sjme.v2i2.1322

Adhikari, K. P., Joshi, D. R., Belbase, S., Sharma, L., & Khanal, B. (2023). Mathematics teachers' self-reported practices of formative assessments in teaching mathematics online. *International Journal of Online Pedagogy and Course Design (IJOPCD), 13*(1), 1-19. doi:https://doi.org/10.4018/ijopcd.324603

Afriyani, N., Indrayani, I., Indrawan, M. G., Wibisono, C., & Ngaliman, N. (2023). The influence of training, discipline, and innovation on the performance of members of the Regional National Crafts Council (Dekranasda) in Tanjungpinang City: A quantitative study. *Journal of Multidisciplinary Academic Business Studies, 1*(1), 53-69. doi:https://doi.org/10.35912/jomabs.v1i1.1780

Akram, M. (2018). Development and validation of school teacher effectiveness questionnaire. *Journal of Research & Reflections in Education (JRRE), 12*(2), 154-174.

Alberts, K. M., Beymer, P. N., Phun, V., & Schmidt, J. A. (2022). Examining a utility value intervention among early adolescents: Trajectories of situational interest and boredom. *Learning and Individual Differences, 96*, 1-34. doi:https://doi.org/10.1016/j.lindif.2022.102155

Anyichie, A. C., Butler, D. L., & Nashon, S. M. (2023). Exploring teacher practices for enhancing student engagement in culturally diverse classrooms. *Journal of Pedagogical Research, 7*(5), 183-207. doi:https://doi.org/10.33902/jpr.202322739

Asbar, A., Mahmud, M., & Halim, A. (2025). Unpacking genre-based instruction: Cognitive, emotional, and behavioral engagement in high school writing. *Seltics Journal: Scope of English Language Teaching Literature and Linguistics, 8*(1), 1-15. doi:https://doi.org/10.46918/seltics.v8i1.2599

Ayua, G. A. (2017). Effective teaching strategies. *Orientation and Refresher Workshop for Teachers*, 1-9. doi:https://doi.org/10.13140/RG.2.2.34147.09765

Balogun, A. G., Balogun, S. K., & Onyencho, C. V. (2017). Test anxiety and academic performance among undergraduates: The moderating role of achievement motivation. *The Spanish journal of psychology, 20*. doi:https://doi.org/10.1017/sjp.2017.5

Bennett, T. A., & Boesdorfer, S. B. (2020). Coupling phet simulations and pogil: High school chemistry students' learning and engagement in aurgumentation on the topic of atomic theory. *Journal of Teacher Action Research, 6*(2), 26-53.

Bhati, K., & Sethy, T. (2022). Self-efficacy: Theory to educational practice. *The International Journal of Indian Psychology, 10*(1), 1123-1128. doi:https://doi.org/10.25215/1001.112

Campanilla, N. S. (2024). Exploratory analysis of learners' motivation on learning mathematics in Philippines. *Journal of Social, Humanity, and Education, 5*(1), 37-59. doi:https://doi.org/10.35912/jshe.v5i1.2115

Cents-Boonstra, M., Lichtwarck-Aschoff, A., Denessen, E., Aelterman, N., & Haerens, L. (2021). Fostering student engagement with motivating teaching: An observation study of teacher and student behaviours. *Research Papers in Education, 36*(6), 754-779. doi:https://doi.org/10.1080/02671522.2020.1767184

Chiu, T. K., Moorhouse, B. L., Chai, C. S., & Ismailov, M. (2023). Teacher support and student motivation to learn with Artificial Intelligence (AI) based chatbot. *Interactive Learning Environments, 32*(7), 3240-3256. doi:https://doi.org/10.1080/10494820.2023.2172044

Daher, W., Sabbah, K., & Abuzant, M. (2021). Affective engagement of higher education students in an online course. *Emerging Science Journal, 5*(4), 545-558. doi:https://doi.org/10.28991/esj-2021-01296

Delos Santos, B. D. J., Badayos, S. M., Beller, J., Ponce, P. M., Cagas, L., & Jamara, A. (2026). Teacher-student interaction and students' motivation as predictors of students' mathematics achievement. *Journal of Social, Humanity, and Education, 6*(2), 153-172. doi:https://doi.org/10.35912/jshe.v6i2.3807

Ferrer, J., Ringer, A., Saville, K., A Parris, M., & Kashi, K. (2022). Students' motivation and engagement in higher education: The importance of attitude to online learning. *Higher Education, 83*(2), 317-338. doi:https://doi.org/10.1007/s10734-020-00657-5

Filgona, J., Sakiyo, J., Gwany, D., & Okoronka, A. (2020). Motivation in learning. *Asian Journal of Education and Social Studies, 10*(4), 16-37. doi:https://doi.org/10.9734/AJESS/2020/v10i430273

Fiorella, L., Yoon, S. Y., Atit, K., Power, J. R., Panther, G., Sorby, S., . . . Veurink, N. (2021). Validation of the Mathematics Motivation Questionnaire (MMQ) for secondary school students. *International Journal of STEM Education, 8*(1), 1-14. doi:https://doi.org/10.1186/s40594-021-00307-x

Garcia, M. C. N. (2022). Teaching and learning practices and student engagement in one dental institution. *Asia Pacific Journal of Educational Perspective, 9*(1), 114.

Goagoses, N., Suovuo, T. b., Winschiers-Theophilus, H., Suero Montero, C., Pope, N., Roetkoenen, E., & Sutinen, E. (2024). A systematic review of social classroom climate in online and technology-enhanced learning environments in primary and secondary school. *Education and Information Technologies, 29*(2), 2009-2042. doi:https://doi.org/10.1007/s10639-023-11705-9

Goldberg, P., Sümer, Ö., Stürmer, K., Wagner, W., Göllner, R., Gerjets, P., . . . Trautwein, U. (2021). Attentive or not? Toward a machine learning approach to assessing students' visible engagement in classroom instruction. *Educational Psychology Review, 33*(1), 27-49. doi:https://doi.org/10.1007/s10648-019-09514-z

Goto, T. (2024). Brief research report: The impact of a utility-value intervention on students' engagement. *The journal of experimental education, 92*(4), 713-722. doi:https://doi.org/10.1080/00220973.2023.2229757

Guerriero, S. (2017). Teachers' Pedagogical Knowledge: What It Is and How It Functions. In S. Guerriero (Ed.), *Pedagogical Knowledge and the Changing Nature of the Teaching Profession*. Paris: OECD Publishing.

Hafezi, A., & Etemadi, S. (2022). Understanding the causes, factors, and methods of reducing students' exam anxiety in high school exams. *Journal of Social, Humanity, and Education, 2*(2), 153-165. doi:https://doi.org/10.35912/jshe.v2i2.869

Harbour, K. E., Evanovich, L. L., Sweigart, C. A., & Hughes, L. E. (2015). A brief review of effective teaching practices that maximize student engagement. *Preventing school failure: alternative education for children and youth, 59*(1), 5-13. doi:https://doi.org/10.1080/1045988X.2014.919136

Hayat, A. A., Shateri, K., Amini, M., & Shokrpour, N. (2020). Relationships between academic self-efficacy, learning-related emotions, and metacognitive learning strategies with academic performance in medical students: A structural equation model. *BMC Medical Education, 20*(1), 1-11. doi:https://doi.org/10.1186/s12909-020-01995-9

Heilporn, G., Lakhal, S., & Bélisle, M. (2021). An examination of teachers' strategies to foster student engagement in blended learning in higher education. *International journal of educational technology in higher education, 18*(1), 1-25. doi:https://doi.org/10.1186/s41239-021-00260-3

Huang, B., Hew, K. F., & Lo, C. K. (2019). Investigating the effects of gamification-enhanced flipped learning on undergraduate students' behavioral and cognitive engagement. *Interactive Learning Environments, 27*(8), 1106-1126. doi:https://doi.org/10.1080/10494820.2018.1495653

Inzlicht, M., Werner, K. M., Briskin, J. L., & Roberts, B. W. (2021). Integrating models of self-regulation. *Annual review of psychology, 72*(1), 319-345. doi:https://doi.org/10.1146/annurev-psych-061020-105721

Jia, H. (2022). English as a foreign language learners' well-being and their academic engagement: The mediating role of English as a foreign language learners' self-efficacy. *Frontiers in Psychology, 13*, 1-7. doi:https://doi.org/10.3389/fpsyg.2022.882886

Kahu, E. R., & Nelson, K. (2018). Student engagement in the educational interface: Understanding the mechanisms of student success. *Higher Education Research & Development, 37*(1), 58-71. doi:https://doi.org/10.1080/07294360.2017.1344197

Kamper, S. J. (2020). Types of research questions: Descriptive, predictive, or causal. *Journal of Orthopaedic & Sports Physical Therapy, 50*(8), 468-469. doi:https://doi.org/10.2519/jospt.2020.0703

Karngbeae, L. D., & Kennedy, G. (2022). Instructional planning: Its importance and basic components. *International Journal Of Social Science And Education Research Studies, 2*(12), 802-810. doi:https://doi.org/10.55677/ijssers/v02i12y2022-13

Khaliq, B. A., Raza, A., & Ajmal, F. (2025). Relationship between communication skills and classroom management skills of elementary school teachers. *Journal of Research in Social Sciences, 13*(1), 1-15. doi:https://doi.org/10.52015/jrss.13i1.285

Kotera, Y., Taylor, E., Fido, D., Williams, D., & Tsuda-McCaie, F. (2023). Motivation of UK graduate students in education: Self-compassion moderates pathway from extrinsic motivation to intrinsic motivation. *Current Psychology, 42*(12), 10163-10176. doi:https://doi.org/10.1007/s12144-021-02301-6

Lawson, H. A., & Lawson, M. A. (2020). Student engagement and disengagement as a collective action problem. *Education Sciences, 10*(8), 1-20. doi:https://doi.org/10.3390/educsci10080212

Li, J., & Xue, E. (2023). Dynamic interaction between student learning behaviour and learning environment: Meta-analysis of student engagement and its influencing factors. *Behavioral Sciences, 13*(1), 1-15. doi:https://doi.org/10.3390/bs13010059
Liu, Y., Ma, S., & Chen, Y. (2024). The impacts of learning motivation, emotional engagement and psychological capital on academic performance in a blended learning university course. *Frontiers in Psychology, 15*, 1357936. doi:https://doi.org/10.3389/fpsyg.2024.1357936
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. doi:https://doi.org/10.9734/ajess/2024/v50i41310
Lumbantoruan, J. H. (2024). The impact of student engagement and motivation in the statistics learning process. *REDIMAT-Journal of Research in Mathematics Education, 13*(1), 1-22. doi:https://doi.org/10.17583/redimat.12884
Maamin, M., Maat, S. M., & Iksan, Z. H. (2021). The influence of student engagement on mathematical achievement among secondary school students. *Mathematics, 10*(1), 1-14. doi:https://doi.org/10.3390/math10010041
Mahdi, S. (2023). Effective communication in learning: Teacher strategies and their impact on student learning outcomes. *International Journal of Linguistics, Communication, and Broadcasting, 1*(4), 26-30. doi:https://doi.org/10.46336/ijlcb.v1i4.26
Martin, A. J., Ginns, P., & Papworth, B. (2017). Motivation and engagement: Same or different? Does it matter?. *Learning and Individual Differences, 55*, 150-162. doi:https://doi.org/10.1016/j.lindif.2017.03.013
Masud, N. A., Mensah, J., Subarna, M. T. N., & Hasan, M. (2023). A comprehensive review of international students' perceptions of the learning environment in relation to academic achievement. *Journal of Social, Humanity, and Education, 3*(3), 219-236. doi:https://doi.org/10.35912/jshe.v3i3.1434
Nässtrom, G., Andersson, C., Granberg, C., Palm, T., & Palmberg, B. (2021). Changes in student motivation and teacher decision making when implementing a formative assessment practice. *Frontiers in Education, 6*, 1-17. doi:https://doi.org/10.3389/feduc.2021.616216
Nguyen, T. D., Cannata, M., & Miller, J. (2018). Understanding student behavioral engagement: Importance of student interaction with peers and teachers. *The journal of educational research, 111*(2), 163-174. doi:https://doi.org/10.1080/00220671.2016.1220359
Nieminen, J. H. (2024). Assessment for Inclusion: rethinking inclusive assessment in higher education. *Teaching in Higher Education, 29*(4), 841-859. doi:https://doi.org/10.1080/13562517.2021.2021395
Noor, S., Tajik, O., & Golzar, J. (2022). Simple random sampling. *International Journal of Education & Language Studies, 1*(2), 78-82. doi:https://doi.org/10.22034/ijels.2022.162982
Pulmones, R. (2023). Student's expectations and engagement: A comprehensive report on education students at St. Scholastica's College Manila. *Journal of School Research, 2*, 41-69. doi:Student's Expectations and Engagement: A Comprehensive Report on Education Students at St. Scholastica's College Manila
Qian, Y., & Saidin, K. (2025). Exploring factors influencing student engagement: A concept paper. *Indian Journal of Information Sources and Services, 15*(1), 320-326. doi:https://doi.org/10.51983/ijiss-2025.ijiss.15.1.41
Rehman, S. U., Javed, E., & Abiodullah, M. (2021). Effects of test anxiety on academic achievement at secondary school level in Lahore. *Bulletin of Education and research, 43*(3), 67-80.
Rollnick, M., & Mavhunga, E. (2016). The Place of Subject Matter Knowledge in Teacher Education. In J. Loughran & M. L. Hamilton (Eds.), *International Handbook of Teacher Education* (pp. 423-452). Cham: Springer.
Saadon, N. F. S. M., Ahmad, I., & Hanapi, A. N. C. P. C. (2020). The implementation of augmented reality in increasing student motivation: Systematic literature review. *IOP Conference Series: Materials Science and Engineering, 854*(1), 1-7. doi:https://doi.org/10.1088/1757-899x/854/1/012043

Saptono, L., & Matondang, I. V. (2023). The effect of teacher competence on student academic stress. *European Journal of Education and Pedagogy, 4*(4), 47-52. doi:https://doi.org/10.24018/ejedu.2023.4.4.704
Seeram, E. (2019). An Overview of Correlational Research. *Radiologic technology, 91*(2), 176.
Siedlecki, S. L. (2020). Understanding descriptive research designs and methods. *Clinical Nurse Specialist, 34*(1), 8-12. doi:https://doi.org/10.1097/nur.0000000000000493
Silverman, D. M., Hulleman, C. S., & Tibbetts, Y. (2023). Identifying the psychological mechanisms of utility-value activities to inform educational research and practice. *British Journal of Educational Psychology, 93*(4), 960-977. doi:https://doi.org/10.1111/bjep.12614
Singh, M., James, P., Paul, H., & Bolar, K. (2022). Impact of cognitive-behavioral motivation on student engagement. *Heliyon, 8*(7), 1-9. doi:https://doi.org/10.1016/j.heliyon.2022.e09843
Suyatno, Jumintono, Pambudi, D. I., Mardati, A., & Wantini. (2019). Strategy of values education in the Indonesian education system. *International Journal of Instruction, 12*(1), 607-624. doi:https://doi.org/10.29333/iji.2019.12139a
Taş, H., & Minaz, M. B. (2024). The effects of learning style-based differentiated instructional activities on academic achievement and learning retention in the social studies course. *Sage Open, 14*(2), 1-14. doi:https://doi.org/10.1177/21582440241249290
Tshering, K., Dorji, P., & Jatsho, S. (2024). Enhancing students' behavioural and cognitive engagement through active learning strategies in physics. *International Journal of Didactical Studies, 5*(1), 1-10. doi:https://doi.org/10.33902/ijods.202423328
Ucol, I. (2025). Innovative teaching practices and teachers' effectiveness in Panabo City division. *EPRA International Journal of Environmental Economics, Commerce and Educational Management*, 510-517. doi:https://doi.org/10.36713/epra23427
Uibu, K., Salo, A., Ugaste, A., & Rasku-Puttonen, H. (2023). Observed teaching practices interpreted from the perspective of school-based teacher educators. *European Journal of Teacher Education, 46*(2), 203-221. doi:https://doi.org/10.1080/02619768.2021.1900110
Vale, I., & Barbosa, A. (2023). Active learning strategies for an effective mathematics teaching and learning. *European Journal of Science and Mathematics Education, 11*(3), 573-588. doi:https://doi.org/10.30935/scimath/13135
Vanslambrouck, S., Zhu, C., Lombaerts, K., Philipsen, B., & Tondeur, J. (2018). Students' motivation and subjective task value of participating in online and blended learning environments. *The internet and higher education, 36*, 33-40. doi:https://doi.org/10.1016/j.iheduc.2017.09.002
Vereijken, M. W., & Rijst, R. M. v. d. (2023). Subject matter pedagogy in university teaching: How lecturers use relations between theory and practice. *Teaching in Higher Education, 28*(4), 880-893. doi:https://doi.org/10.1080/13562517.2020.1863352
Waddington, J. (2023). Self-Efficacy. *ELT journal, 77*(2), 237-240. doi:https://doi.org/10.1093/elt/ccac046
Wadi, M., Yusoff, M. S. B., Rahim, A. F. A., & Lah, N. A. Z. N. (2022). Factors affecting test anxiety: A qualitative analysis of medical students' views. *BMC psychology, 10*(1), 1-8. doi:https://doi.org/10.1186/s40359-021-00715-2
Xie, F., & Derakhshan, A. (2021). A conceptual review of positive teacher interpersonal communication behaviors in the instructional context. *Frontiers in Psychology, 12*, 1-10. doi:https://doi.org/10.3389/fpsyg.2021.708490
Xiong, X. (2025). Influence of teaching styles of higher education teachers on students 'engagement in learning: The mediating role of learning motivation. *Education for Chemical Engineers, 51*(2), 87-102. doi:https://doi.org/10.1016/j.ece.2025.02.005
Yong, F. L., Kong, M., & Albert, F. (2024). An empirical study on college students' academic engagement in Sabah, Malaysia. *International Journal of Novel Research in Education and Learning, 11*(2), 1-10. doi:https://doi.org/10.5281/zenodo.10948834