Forecasting Confidence in Mathematics using Student Persistence and Consensus Classroom Climate as Predictors

Jernel C. Ondong

jernel.ondong@hcdc.edu.ph

Island Garden City of Samal, Davao del Norte 8119, Philippines

Abstract

Low student confidence in mathematics persists. The strength to forecast student confidence in mathematics using mathematics persistence and consensus classroom climate as predictors was examined. Predictive research design was used. Data gathered from 226 Senior High School students selected through stratified random sampling were analyzed using multiple linear regression analysis. The results showed that the criterion was significantly predicted. The strength of the model was strong (65.8%). The Social Cognitive Theory was partially supported. Educational leaders may implement professional development programs relevant to improving mathematics persistence and consensus classroom climate. Qualitative research may extract themes considered as potential variables to account for the remaining (34.2%) of the variance in the strength of the model.

Keywords: Forecasting confidence in mathematics; student persistence; consensus classroom climate

1. Introduction

Low student confidence in mathematics has become a global educational concern (Pulungan et al., 2022). Students who lacked confidence performed poorly on tasks and were unwilling to participate in any activities (Sorsen, 2024). Students with low confidence in mathematics sometimes doubt their skills and hide when faced with challenging assignments. Furthermore, low confidence becomes a critical barrier to meaningful Learning and long-term academic success (Zakariya, 2022).

Research in various international educational settings indicates significant disparities in student confidence in mathematics, which is frequently low (Djekourmane et al., 2025; Street et al., 2024). For example, a study conducted in rural China found that students demonstrated markedly low confidence, ranking last among regions with inadequate school and teacher support (Gao et al., 2022). In Brazil, Costa Rica, Cambodia, South Africa, and the United States, similar trends have been seen. All these countries have lost some confidence in math, especially among female students (Hannan et al., 2024; Para & Johnston-Wilder, 2023; Meza-Cascante et al., 2019; Campbell et al., 2025).

Recent studies in the Philippine context consistently emphasized that low student confidence in mathematics remains a persistent concern across different educational levels. Oclarit et al. (2025) found that non-mathematics major students exhibited only moderate to low levels of self-efficacy, indicating limited confidence in performing mathematical tasks within classroom settings. Similarly, Lazarra (2025) reported that college students demonstrated low mathematics self-efficacy, reflecting weakened belief in their ability to solve mathematical problems effectively. In the same vein, Montillano et al. (2025) found that students enrolled in calculus courses at a state university exhibited varying, but generally insufficient, levels of self-efficacy, suggesting challenges in perceived competence when dealing with advanced mathematical concepts. Furthermore, Mabuti (2024) emphasized that even with instructional interventions, learners still

manifested low to moderate levels of mathematics self-efficacy, indicating that confidence in mathematics remains a continuing instructional challenge.

Low student confidence in mathematics is associated with decreased motivation, avoidance of challenging tasks, and poorer academic performance. It can also limit students' persistence and reduce their likelihood of pursuing mathematics-related or STEM careers (Bendol et al., 2025). Even though there is more research on student confidence both internationally and locally, significant gaps remain in the specific classroom and contextual factors that affect student confidence in math, especially in learning environments after the pandemic. Prior studies have examined the correlations among confidence and anxiety, gender, and socioeconomic status; however, there has been insufficient research on the interplay between consensus classroom climate and persistence in mathematics in shaping students' mathematical confidence (Landrum, 2020; Sullivan, 2024). Hence, it is urgent to conduct empirical investigations to identify effective methods for predicting how confident students will be in math. Amidst this urgency, there is a dearth of research about this concern. It is for this reason that this study was pursued.

This research investigated how student confidence can be enhanced by mathematics persistence and a consensus classroom environment to achieve Sustainable Development Goal 4 (Quality Education). This is a crucial aspect of Learning to be fair and meaningful. SDG 4 highlights the importance of a positive, inclusive, and supportive learning environment, which can lead to better learning outcomes and constructive academic behaviors. This research explored how student persistence in mathematics and their perceptions of a consensus classroom environment predict their confidence in math. Furthermore, this study identifies key points that may help enhance learner engagement and success. Educators can also benefit from SDG 4's results as a guide in designing classroom strategies to ensure the goal of providing high-quality, learner-centered instruction is met.

The main purpose of the study was to forecast student confidence in math using mathematics persistence and consensus classroom climate as predictors. Specifically, the following objectives were formulated: 1.) to determine the levels of mathematics persistence in terms of persistence in classroom mathematics exercise, persistence in mathematics take home assignment, persistence in a group mathematics tasks, and persistence in mathematics examination; consensus classroom climate in terms of collaborative learning and environment, inclusive and flexible learning, student agency, student autonomy; and the student confidence in math in terms of collaboration, communication, creativity, self-direction, critical thinking, technology for learning; 2.) to determine the significance of the correlation between mathematics persistence, consensus classroom climate, and student confidence in math; and 3.) to determine the significance of the model to predict student confidence in math using mathematics persistence and consensus classroom climate as predictors.

2. Methodology

2.1 Research Design

This study employed a predictive research design, which aims to forecast or estimate outcomes based on one or more predictor variables. It focuses on identifying relationships that enable researchers to anticipate results rather than merely describe or explain phenomena. This design extends traditional explanatory research by emphasizing the prediction of outcomes using both theoretical and empirical data (van Witteloostuijn et al., 2022).

2.2 Locale of the Study

The study was conducted in secondary schools in Babak District, Island Garden City of Samal, where the student population reflects diverse socioeconomic backgrounds from both rural and coastal communities. These schools were selected not only for their commitment to quality instruction and academic

excellence in mathematics, but also for their capacity to provide an enriching learning environment supported by competent teachers and adequate facilities. The locale was deemed appropriate due to its representativeness of typical public secondary school settings, allowing for a more realistic examination of students' learning behaviors. Furthermore, observable variations in student confidence in mathematics, consensus classroom climate, and persistence in mathematics within these schools provide a relevant basis for analysis. The accessibility of the schools, the willingness of administrators to support the research, and the availability of necessary data also contributed to the selection of the site, making it a suitable framework for investigating the relationship among student confidence, consensus classroom climate, and mathematical persistence.

2.3 Sample and Sampling Technique

From a total population of 520 senior high school students, a sample of 226 respondents was determined using Yamane's formula. The respondents in this study were enrolled at four schools in Babak District, Island Garden City of Samal, during the 2025–2026 school year. Further, students with learning disabilities and those enrolled in Alternative Delivery Mode were excluded from this study. The institution accommodates learners from various social, cultural, and economic backgrounds, making it a suitable site for gathering data that reflects diverse perspectives and experiences. The study focuses on students from different grade levels in the senior high school program to ensure inclusivity and balance in participant representation. By involving learners from Grade 11 to Grade 12, the research captured variations in academic exposure, persistence, and classroom experiences that may influence their confidence.

Furthermore, the researcher used the stratified random sampling technique in the study. It involves separating the target population into homogeneous, mutually exclusive segments; from each segment, simple random sampling is chosen. The selected samples from different strata are combined into a single sample (Iliyasu & Etikan, 2021). This systematic approach guarantees accuracy and minimizes sampling bias, thereby enhancing the credibility of the findings. Through this process, the study ensures that the collected data reliably reflects the characteristics of the entire student population, allowing for meaningful analysis of mathematics persistence, consensus classroom climate, and their relationship to student confidence in math.

2.4. Data Gathering Technique

The survey technique was used to gather data. This technique is commonly applied when researchers aim to measure opinions, attitudes, behaviors, or characteristics across large groups (Goodfellow, 2023). This offers advantages such as reaching large and diverse populations, producing quantifiable data for pattern analysis, enabling generalization, allowing faster data collection, and supporting replicability through standardized procedures (Oranga & Matere, 2025).

In this study, three adapted and modified survey questionnaires were utilized to measure the key variables. The first instrument, which assessed mathematics persistence, was adapted from Ogbu and Ugwu (2023). It consisted of 28 items rated on a 4-point Likert scale to assess students' persistence in learning mathematics. It also demonstrated high reliability (Cronbach's alpha = 0.881) and covered four dimensions: classroom exercises, take-home assignments, group tasks, and examinations.

The second instrument, which measured consensus classroom climate, was adapted from Olarte et al. (2024). It comprised 23 items rated on a four-point Likert scale to evaluate students' perceptions of their classroom environment across four dimensions, namely: collaborative Learning and environment, inclusive and flexible Learning, student agency, and student autonomy. It has a reliability coefficient of 0.711.

The third instrument, adapted from Bray et al. (2020), assessed student confidence in mathematics using 18 items rated on a 4-point Likert scale. It encompasses six key skill areas: communication, collaboration, critical thinking, creativity and innovation, self-direction, and technology for Learning. This instrument also demonstrated strong internal consistency with a Cronbach's alpha of 0.816.

2.5. Data Analysis Technique

In this study, the data analysis techniques used were descriptive, correlation, and regression analyses. Descriptive analysis helps organize and summarize large amounts of data, making it easier for researchers to understand real-world patterns while saving time, no matter the situation or field of study (Costa, 2024). In this study, the mean and standard deviation were used as statistical tools. Moreover, the correlation analysis examines the strength and direction of the relationship between two continuous variables (Rizk, 2023). The Pearson Product- moment correlation statistical tool was used. Lastly, regression analysis is a statistical method used to examine the relationship between a dependent variable and one or more independent variables, applied when predicting outcomes or determining the strength of associations, and it offers advantages such as identifying significant predictors, enabling forecasting, and supporting data-driven decision-making (James et al., 2023). Further, the unstandardized beta (β) coefficient was used in determining the strength of the determinants.

2.6. Ethical Considerations

Respondents were adequately informed regarding the study objectives, procedures, and their right to discontinue participation at any time, with informed consent secured prior to the commencement of data collection. The confidentiality of respondents was strictly upheld through anonymization of data and the use of secure storage systems, accessible only to authorized members of the research team. The study was carefully structured to avoid any harm, ensuring that participants understood their rights and could withdraw freely without penalty. The research was conducted with honesty, integrity, and respect, safeguarding participants' privacy and recognizing the value of their contributions. Ethical approval was obtained from the SMILE Ethics Board, and permission to conduct the study was respectfully sought and granted by the Department of Education (DepEd). Moreover, the research prioritized enhancing benefits, reducing potential risks, and maintaining fairness throughout the process, with results presented transparently and any conflicts of interest clearly disclosed to preserve research credibility.

3. Results and Discussions

3.1 Descriptive Analysis

Shown in Table 1 are the descriptive statistical results of the study, including the variables involved, namely: mathematics persistence, consensus classroom climate, and student confidence in mathematics, with their respective indicators. Likewise, the number of samples, standard deviation, mean, and descriptive level for each variable are provided in the table.

Table 1: Descriptive Statistics (n = 226)

Variables	Number of Samples (n)	Standard Deviation	Mean	Descriptive Level

Mathematics Persistence	**226**	**0.53**	**2.76**	**High**
Classroom mathematics exercise		*0.40*	*2.76*	*High*
Mathematics take-home assignment		*0.50*	*2.66*	*High*
Group mathematics task		*0.51*	*2.69*	*High*
Mathematics examination		*0.49*	*2.91*	*High*
Consensus classroom climate	**226**	**0.41**	**2.90**	**High**
Collaborative learning environment		*0.46*	*2.82*	*High*
Inclusive and flexible learning		*0.49*	*2.91*	*High*
Student agency		*0.47*	*2.94*	*High*
Students autonomy		*0.58*	*2.93*	*High*
Student confidence in Mathematics	**226**	**0.40**	**2.92**	**High**
Collaboration		0.54	3.05	*High*
Communication		0.51	2.82	*High*
Creativity		0.52	2.91	*High*
Managing myself-direction		0.55	2.88	*High*
Use technology for educational purposes		0.51	2.95	*High*

Specifically, the table shows that mathematics persistence obtained a mean of 2.76, described as high. This indicates that the respondents are good at their persistence in math subjects. All indicators obtained a high level. The standard deviation of 0.53 is described as moderately consistent, indicating acceptable consistency. Furthermore, the consensus classroom climate variable obtained a mean of 2.90, described as high. This indicates that the respondents' consensus classroom climate is good. All its indicators are described as high-level. The standard deviation of 0.41, which is described as highly consistent, indicates strong and uniform perception. Finally, the student confidence in mathematics variable obtained a mean of 2.92, described as a high level. This signifies that students are confident in math. Consistently, all indicators are described as high-level. The standard deviation of 0.40, which is considered highly consistent, indicates strong and uniform perception.

Mathematics persistence and consensus classroom climate are both viewed positively by students, though their individual perceptions of persistence show more variation than their views on the classroom environment. Similarly, students maintain a high level of confidence in the subject, sharing a more uniform and consistent sense of confidence than they do regarding their mathematics persistence.

3.2 Correlation Analysis

Table 2 is correlational. It presents the predictive and criterion variables. It shows the r-value, p-value, decision on the null hypothesis, and the corresponding interpretation.

Table 2: Correlational Table (n = 226)

Variables	**Student Confidence in Mathematics**			
	r-value	p-value	Decision on H_o	Interpretation

Mathematics Persistence	0.697	0.000	Reject H_o	Moderately high positive, significant correlation
Consensus Classroom Climate	0.804	0.000	Reject H_o	Moderately high positive, significant correlation

Level of Significance: 0.05
Decision Rule: Reject Ho if p < 0.05

Specifically, the table shows that the correlation between mathematics persistence and student confidence in mathematics obtained a p-value of 0.000, which is lower than the 0.05 level of significance; hence, the null hypothesis was rejected, indicating that the correlation is significant. The r-value of 0.697 reflects a moderately high positive correlation between mathematics persistence and student confidence in math. This finding implies that when students demonstrate greater persistence in their mathematical studies, they also tend to possess significantly higher levels of confidence in math. Similarly, consensus classroom climate yielded a p-value of 0.000, which is also lower than the 0.05 level of significance; hence, the null hypothesis was rejected, indicating that the correlation is significant. The r-value of 0.804 shows a moderately high positive correlation between consensus classroom climate and student confidence in mathematics. This implies that a classroom environment characterized by strong consensus significantly enhances students' confidence in their mathematical abilities.

Mathematics persistence and a consensus classroom climate are both strongly linked to increased student confidence. However, the classroom social environment appears to have a stronger connection to that self-assurance than individual persistence does. These findings suggest that while a student's personal drive is important, a supportive and unified classroom atmosphere plays an even more significant role in fostering their belief in their mathematical abilities.

3.3 Regression Analysis

Presented in Table 3 are the predictors and criterion variables. The table also includes the unstandardized beta, standard error, standardized beta, t-value, p-value, decision on null hypothesis, and the corresponding interpretation.

Table 3: Regression Table (n = 226)

	Student Confidence in Mathematics	
Variables	Unstandardized Coefficient	Standardized Coefficient

	B	Std. Error	B	T	Sig.	Decision on H_o	Interpretation
Constant	0.611	0.11	—	5.33	0.000	—	—
Mathematics Persistence	0.171	0.06	0.17	2.72	0.007	Reject H_0	Positive significant influence
Consensus Classroom Climate	0.631	0.06	0.67	10.58	0.000	Reject H_0	Positive significant influence

Model Summary:
R = 0.811 | R^2 = 0.658 | Adjusted R^2 = 0.655 | F (2,223) = 214 | p = 0.000
Level of Significance: *0.05*
Decision Rule: *Reject H_0 if p < 0.05*

Based on the data presented in Table 3, the regression formula for this study is:

SCM = 0.171MP + 0.631CCC + 0.611

Further, the model obtained a p < .00 for both variables, which were below the 0.05 level of significance; thus, the null hypothesis was rejected. It indicates that the model is significant. The corresponding coefficient of determination (R2) is 0.658, indicating that the model strongly predicts the criterion, meaning that approximately 65.8% of the variance in student confidence in math can be explained by the model. The F-statistic of 214 (p = .000) further confirms that the overall model is a significant fit for the data. These findings suggest that fostering a supportive, consensus-driven classroom environment while encouraging student persistence are effective strategies for boosting mathematical confidence.

3.4 Mathematics Persistence and Student Confidence in Mathematics Correlation

The finding that mathematics persistence significantly correlates with student confidence in math aligns with the finding that the mastery experience principle, suggesting that as students develop higher levels of determination and resilience when facing academic difficulties, they gradually build a stronger belief in their ability to succeed in mathematical tasks (Madrilejos, 2025). In this context, persistence is not merely a result of confidence; rather, the tangible act of persevering through complex mathematical problems serves as the psychological mechanism that reinforces a student's internal confidence (Lera et al., 2025). On the contrary, this finding provides a nuanced perspective to Xiao et al. (2021), who suggested that persistence in mathematics is not uniformly associated with confidence, because some students exhibit relatively high persistence while still experiencing high levels of anxiety or low perceived control in mathematics. This suggests that persistence alone does not guarantee increased confidence, as emotional and cognitive factors may independently influence students' beliefs about their abilities.

3.5 Consensus Classroom Climate and Student Confidence in Mathematics Correlation

The finding that consensus classroom climate has a moderately significant correlation with student confidence in math supports the previous study by Lehikoinen et al. (2024), which found that confidence is highly adaptive and is significantly strengthened when the classroom atmosphere reduces anxiety and fosters a sense of control over learning outcomes. Moreover, the current finding corroborates that of Lee et al. (2026), who emphasized a strong positive correlation between school/classroom climate and a student's mathematical disposition, including their confidence and perseverance. On the other hand, this current finding contrasts with the study by Ramazan et al. (2023), which indicated that classroom climate showed only a weak and indirect relationship with students' mathematics self-concept, suggesting that it was not a strong or primary determinant of student confidence in mathematics.

3.6 The Predictive Model for Student Confidence in Math with Mathematics Persistence and Consensus Classroom Climate as Predictors

This study found that a predictive model of student confidence in mathematics, with mathematics persistence and consensus classroom climate as predictors, was significant. This finding affirms the study of Cuabo et al. (2024), stating that students' attitudes toward mathematics significantly predict student confidence in math, highlighting that internal dispositions closely linked to persistence contribute to positive mathematical outcomes. Likewise, this current finding supports the study of Feng et al. (2025), which emphasizes that the classroom learning environment plays a crucial role in shaping students' satisfaction and success, and that classroom climate is a key determinant of student confidence in math. On the contrary, this current finding contradicts the study of Foster and Renie (2025), which found that the predictive model implies that metacognitive factors and self-perception accuracy play a more central role than environmental and persistence-based predictors in shaping student confidence in mathematics. The study of Foster et al. used a sample of 117 participants, whereas the present study used a larger sample of 226 respondents.

4. Conclusion

Based on the findings, it is concluded that student confidence in math was strongly 65.8% and significantly forecasted using mathematics persistence and consensus classroom climate as predictors. Hence, the Social Cognitive Theory (SCT), which posits that human behavior is influenced by the dynamic interaction of personal factors, environmental factors, and behavioral factors, was partly supported.

5. Recommendations

Based on the conclusion, the following are recommended:

1) School leaders may implement programs and activities that strengthen the consensus classroom climate, as this has a stronger influence on student confidence in mathematics than mathematics persistence. Teachers may undergo continuous professional development to enhance their skills in creating a supportive learning environment.
2) Future research may consider incorporating additional relevant variables to account for the remaining 34.2% of the model's variance, thereby validating and expanding the predictive model across diverse educational contexts. Qualitative research may be conducted to identify and develop themes that may be considered as potential variables.

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