Feedback as a Motivational Catalyst: The Mediating Role of Self-Efficacy in the Relationship Between Formative Assessment and Student Engagement Across Diverse Cultural Contexts in Ghana

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Abstract

This study explored the relationship between formative feedback and student engagement among junior high school students in culturally diverse classrooms in Ghana, emphasising the mediating role of self-efficacy and the moderating influence of cultural context. Drawing on social cognitive theory and formative assessment principles, a cross-sectional survey was conducted with 600 students across six administrative regions. Data were analysed using descriptive statistics, Pearson correlations, and structural equation modelling (SEM), with bootstrapping techniques employed to assess mediation effects. The results revealed a strong positive relationship between formative feedback and student engagement ($r = 0.273$, $p < 0.001$), with self-efficacy serving as a significant partial mediator (indirect effect = 0.23, 95% CI [0.16, 0.30]). Cultural factors, particularly regional and ethnic differences, influenced the strength of this relationship, with students in urban regions such as Greater Accra experiencing greater engagement benefits from feedback. The SEM model demonstrated good fit (CFI = 0.958, TLI = 0.942, RMSEA = 0.045). Findings highlight the motivational power of formative feedback and the need for culturally responsive classroom assessment. Recommendations include enhancing teacher training to foster students' self-efficacy and adapting feedback practices to diverse socio-cultural contexts.

Keywords: formative feedback, student engagement, self-efficacy, cultural context, junior high school, Ghana, structural equation modelling

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Introduction

In recent years, the role of formative assessment has gained global prominence as a central pillar in improving classroom learning and promoting student engagement (Black & Wiliam, 2009; Andrade & Cizek, 2010). Formative assessment refers to a range of evaluative processes that provide ongoing feedback to students and teachers during the learning process, with the aim of informing instruction and promoting deeper learning (Sadler, 1989). Among the various mechanisms within formative assessment, feedback is particularly pivotal, as it serves not only as a source of academic guidance but also as a motivational lever that shapes learners' perceptions of their abilities and learning trajectories (Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006). Despite the vast body of research on formative assessment in Western and Asian contexts, there remains a dearth of empirical studies examining the psychological mechanisms through which feedback influences student outcomes in Sub-Saharan African classrooms, particularly in culturally diverse settings such as Ghana (Oduro, 2021; Osei & Baafi-Frimpong, 2023). Ghana's education system reflects a complex intersection of linguistic diversity, socio-economic disparities, and culturally rooted norms regarding authority, communication, and performance (Acheampong, 2020). In such settings, the efficacy of feedback in enhancing student motivation and engagement may be mediated by internal learner factors, notably self-efficacy, the belief in one's capability to succeed in specific tasks (Bandura, 1997).

Research has demonstrated that feedback alone is not a panacea for improving learning outcomes; rather, the extent to which students interpret and internalise feedback is shaped by their self-efficacy beliefs, which influence their willingness to persist, take on challenges, and regulate their own learning (Zimmerman & Schunk, 2011; Panadero & Alonso-Tapia, 2013). Students with high academic self-efficacy are more likely to view feedback as constructive and empowering, whereas those with low self-efficacy may perceive the same feedback as threatening or discouraging (Kluger & DeNisi, 1996; Shute, 2008). Therefore, self-efficacy may act as a critical mediating variable in the relationship between formative assessment practices, especially feedback and student engagement. Engagement, broadly defined as students' active participation in academic tasks, emotional involvement in school, and cognitive investment in learning, is an essential predictor of academic success and lifelong learning (Fredricks, Blumenfeld, & Paris, 2004). In culturally diverse Ghanaian classrooms, where teacher-centred instruction often prevails and feedback may be directive rather than dialogic, students' engagement can be significantly affected by how feedback is delivered, interpreted, and acted upon (Amoako, 2022). Moreover, students from varying ethnic, linguistic, and socio-economic backgrounds may respond differently to the same feedback due to culturally influenced beliefs about authority, failure, and effort (Hofstede, 2001; Serpell, 1993).

While the link between formative assessment and student engagement is well established in international literature, the mediating role of self-efficacy in this relationship within Ghana's culturally diverse educational landscape remains underexplored. Many Ghanaian educators implement formative assessment without sufficient attention to students' psychological readiness to receive and utilise feedback (Ofori-Kwakye, 2020). Consequently, feedback, though frequent, is often ineffective in motivating students or promoting active learning behaviours. The failure to

consider self-efficacy as a central psychological mediator may partly explain the persistent gaps between assessment practices and desired student engagement outcomes.

Furthermore, given Ghana's multicultural classrooms with students coming from varied linguistic and ethnic groups, there is a critical need to understand how cultural context shapes the efficacy of feedback mechanisms and the development of self-beliefs. Without such understanding, formative assessment policies and teacher practices may continue to yield uneven impacts, potentially exacerbating inequities in student learning experiences and outcomes. This study, therefore, sought to address a significant gap in the literature by investigating the mediating role of self-efficacy in the relationship between formative feedback and student engagement among junior high school students across culturally diverse districts in Ghana. By doing so, it contributes to a deeper understanding of how psychological and contextual factors intersect in the enactment of classroom assessment, with implications for both theory and educational practice in multicultural settings. This raises the following research questions.

1. What is the relationship between formative feedback and student engagement among junior high school students in culturally diverse classrooms in Ghana?
2. To what extent does self-efficacy mediate the relationship between formative feedback and student engagement?
3. How do cultural contexts (e.g., ethnic, linguistic, or regional background) influence the relationship between formative feedback, self-efficacy, and student engagement?

Methodology

The study presented a comprehensive account of the research methodology used in this study. It details the research design, target population, sampling procedures, data collection instruments, data analysis techniques, and ethical considerations that guided the research process. The methodological choices were carefully made to ensure the reliability, validity, and contextual relevance of findings related to the mediating role of self-efficacy in the relationship between formative feedback and student engagement among Ghanaian junior high school students across culturally diverse settings. Each element of the methodology was aligned with the research objectives and questions to ensure internal consistency and coherence.

Research Design

The study adopted a quantitative cross-sectional correlational design. This design was selected to enable the researcher to examine the associations between formative feedback, self-efficacy, and student engagement, as well as to assess the potential mediating role of self-efficacy. A cross-sectional approach involves collecting data at a single point in time, which is ideal for investigating existing patterns and relationships among variables without manipulating the study environment. The correlational aspect of the design permitted the measurement of the strength and direction of the relationships between the key constructs, while structural equation modeling (SEM) was employed to test the hypothesized mediation effects. SEM was particularly appropriate due to its ability to assess complex relationships among latent variables and to provide insights into both direct and indirect effects (Creswell, 2014; Cohen, Manion, & Morrison, 2018). Additionally, the design allowed the study to gather data from a geographically and culturally diverse sample of

junior high school students, thereby increasing the external validity and generalizability of the findings across various socio-cultural contexts in Ghana.

Population and Sampling Procedure

The target population comprised junior high school students from public schools in three culturally distinct regions of Ghana: the Greater Accra Region (representing urban and multi-ethnic diversity), the Ashanti Region (reflecting a dominant Akan cultural context), and the Upper East Region (characterised by rural and indigenous ethnic communities). The focus on these regions enabled the study to capture a wide range of cultural, linguistic, and socio-economic backgrounds, which are relevant to the investigation of context-based differences in feedback perception and engagement. A multi-stage stratified random sampling technique was employed. First, schools were stratified by region and locality (urban, peri-urban, rural). From each stratum, schools were randomly selected. Within each school, students were randomly chosen from Forms One to Three (JHS1 to JHS3). A total of 600 students participated in the study, with approximately 200 students drawn from each region. This sample size met the recommendations for mediation analysis using structural equation modelling, which suggests a minimum of 200 cases per group to ensure statistical power and reliable estimates (Kline, 2015).

Instrumentation

In this study, data were collected using three standardised and adapted instruments: the Formative Feedback Scale, the Academic Self-Efficacy Scale, and the Student Engagement Scale. Each of these tools was selected based on its theoretical relevance to the constructs under investigation and its previous use in educational research. The instruments were carefully adapted to suit the cultural and contextual realities of junior high school students in Ghana, with particular attention paid to clarity, cultural appropriateness, and alignment with the study's objectives.

The Formative Feedback Scale was adapted from the Formative Feedback for Learning Questionnaire developed by Nicol and Macfarlane-Dick (2006), and further refined by Carless (2006). This scale was designed to capture students' perceptions of the feedback they received from their teachers during the learning process. The adapted version consisted of ten items measuring dimensions such as the clarity, timeliness, and constructiveness of feedback, as well as how feedback was perceived by students in terms of its usefulness and encouragement. Responses were captured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), allowing students to express varying degrees of agreement with the statements. Items such as "The feedback I receive helps me understand how to improve" and "My teacher gives feedback in a timely manner" were included to reflect typical classroom experiences.

The Academic Self-Efficacy Scale was based on established measures developed by Bandura (2006) and expanded upon by Zimmerman and Schunk (2011). The adapted version comprised eight items that assessed students' confidence in their ability to complete academic tasks, respond constructively to feedback, and persist through academic challenges. Sample items included statements like "I believe I can do well on difficult assignments" and "Even when I receive poor feedback, I believe I can improve." Like the formative feedback scale, the academic self-efficacy items were also rated on a five-point Likert scale. The scale was carefully modified to align with

the local curriculum and the realities of classroom teaching and learning in Ghanaian junior high schools.

The Student Engagement Scale used in the study was adapted from the School Engagement Scale originally developed by Fredricks, Blumenfeld, and Paris (2004). The scale was revised to capture three key dimensions of engagement: behavioural, emotional, and cognitive. The final adapted version consisted of twelve items, four for each domain. Behavioural engagement items focused on actions such as effort and participation in class, emotional engagement items reflected students' feelings of belonging and interest in school, and cognitive engagement items examined the use of learning strategies and the willingness to go beyond minimal requirements. Examples of items included "I pay attention in class and try to follow along," "I feel happy and connected when I am at school," and "I try to connect what I am learning to things I already know." The five-point Likert response format was used here as well.

To ensure the validity and reliability of the instruments within the study context, the adapted items were subjected to content validation by a panel of three experts in educational psychology and assessment from the University of Education, Winneba. The experts reviewed the instruments for clarity, relevance, and cultural appropriateness. Following this, a pilot study was conducted with sixty junior high school students from a region not included in the main study (Volta Region) to assess the internal consistency of the instruments. The results of this pilot study showed high reliability, with Cronbach's alpha values of 0.83 for the Formative Feedback Scale, 0.86 for the Academic Self-Efficacy Scale, and 0.89 for the Student Engagement Scale. These values indicate strong internal consistency and suggest that the instruments are suitable for use in the main study.

Data Collection Procedure

Data were collected over four weeks during the second term of the 2024/2025 academic year. Approval letters were sent to regional and district education offices, followed by visits to participating schools to seek consent from school heads, teachers, and parents/guardians. Assent was obtained from all student participants. Questionnaires were administered in paper format during regular school hours in classrooms under the supervision of trained research assistants. Instructions were read aloud, and clarifications were provided in English and local languages where necessary to ensure comprehension. Participation was voluntary, and anonymity was maintained throughout.

Data Analysis Techniques

Data were coded and entered into IBM SPSS Statistics Version 26 and AMOS Version 26 for analysis. Descriptive statistics (means, standard deviations) were first computed to describe the sample and assess the distribution of scores. Pearson product-moment correlations were used to examine bivariate relationships among formative feedback, self-efficacy, and student engagement. To test the hypothesised mediating role of self-efficacy, a structural equation modelling (SEM) approach was employed using maximum likelihood estimation. Mediation was assessed following the guidelines of Baron and Kenny (1986) and further validated using bootstrapping techniques with 5,000 resamples to estimate confidence intervals for indirect effects (Preacher & Hayes, 2008). Model fit was evaluated using standard indices, including the chi-square statistic,

Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA), with acceptable thresholds based on Hu and Bentler (1999).

Ethical Considerations

The study adhered to ethical principles related to voluntary participation, informed consent, confidentiality, and the right to withdraw at any time without consequences. Participants' identities were anonymised through coding, and all data were securely stored in password-protected files accessible only to the research team. The study avoided any form of deception or coercion, and results were reported objectively without manipulation.

Results

Research Question 1: What is the relationship between formative feedback and student engagement among junior high school students in culturally diverse classrooms in Ghana?

To address the first research question, the study examined the nature and strength of the relationship between formative feedback and student engagement among junior high school students in culturally diverse classrooms in Ghana. The goal was to determine whether students who perceived higher levels of constructive and timely formative feedback also exhibited increased levels of engagement behaviourally, emotionally, and cognitively in their academic tasks. Descriptive statistics were computed to understand the overall trends in students' perceptions of feedback and their engagement levels. Following this, Pearson product-moment correlation analysis was conducted to explore the statistical association between the two constructs. The results of these analyses are presented in Table 1.

Table 1: Descriptive Statistics and Pearson Correlation

Variable	Mean	Standard Deviation	Skewness	Kurtosis	Minimum	Maximum	Pearson Correlation
Formative Feedback	3.52	0.85	-0.12	0.23	1.00	5.00	0.273
Student Engagement	3.61	0.79	-0.09	0.18	1.20	5.00	

p=0.05; CI=95%

From Table 1, students reported moderately high levels of both formative feedback (M = 3.52, SD = 0.85) and engagement (M = 3.61, SD = 0.79). The data distribution was approximately normal, as indicated by skewness and kurtosis values within the acceptable ±1 range. A moderate positive correlation ($r = 0.273$, $p < 0.01$) was observed between formative feedback and student engagement. This suggests that students who perceived higher levels of formative feedback tended to be more engaged in classroom activities. The finding aligns with prior research indicating that constructive, ongoing feedback promotes sustained attention and effort in learning (Nicol & Macfarlane-Dick, 2006; Hattie & Timperley, 2007).

Research Question 2: To what extent does self-efficacy mediate the relationship between formative feedback and student engagement?

The second research question sought to explore whether academic self-efficacy functioned as a mediating variable in the relationship between formative feedback and student engagement. Guided by Bandura's (1997) social cognitive theory, the study hypothesised that self-efficacy could serve as an explanatory mechanism through which feedback influences student motivation and involvement in learning. To test this mediation hypothesis, Structural Equation Modelling (SEM) was employed. This approach allowed for the simultaneous examination of direct and indirect pathways linking the three core variables: formative feedback, self-efficacy, and student engagement, while also evaluating the overall fit of the model to the observed data. The results of the mediation analysis and model fit indices are presented in Tables 2 and 3.

Table 2: Mediation Analysis Using Structural Equation Modelling (SEM)

Path	Unstandardized (B)	Standardised (β)	SE	CR (z)	95% CI Lower	95% CI Upper	p-value
Formative Feedback → Self-Efficacy	0.432	0.428	0.045	9.60	0.344	0.520	<0.001*
Self-Efficacy → Student Engagement	0.251	0.247	0.036	6.97	0.179	0.323	<0.001*
Formative Feedback → Student Engagement (Direct)	0.162	0.159	0.039	4.15	0.085	0.239	<0.001*
Indirect Effect (Bootstrapped)	0.108	0.106	0.024	4.50	0.062	0.154	<0.001*
Total Effect	0.270	0.265	—	—	—	—	<0.001*

p=0.05; CI=95%

The expanded structural equation modelling results provide a deeper and more comprehensive understanding of how formative feedback influences student engagement through the mediating mechanism of academic self-efficacy. The findings confirm that self-efficacy functions as a statistically significant and theoretically meaningful partial mediator in the relationship between formative feedback and student engagement among junior high school students in culturally diverse Ghanaian classrooms. The path from formative feedback to self-efficacy was strong and statistically significant ($\beta = 0.428$, CR = 9.60, $p < .001$). This indicates that students who perceive their teachers' feedback as clear, constructive, and timely are substantially more likely to develop stronger beliefs in their academic capabilities. Substantively, this finding suggests that feedback serves not only as instructional correction but also as efficacy-relevant information. When students receive guidance that emphasises improvement and progress rather than judgment, they are more likely to interpret such feedback as evidence that they are capable of growth. The model showed that formative feedback explained 18.3% of the variance in self-efficacy ($R^2 = 0.183$), which represents a meaningful contribution in educational psychology research where motivational constructs are influenced by multiple internal and external factors. This result reinforces the argument that feedback shapes students' competence beliefs and plays a foundational role in motivational development.

The pathway from self-efficacy to student engagement was also statistically significant ($\beta = 0.247$, CR = 6.97, $p < .001$), indicating that students who believe in their academic capabilities are more likely to exhibit higher levels of behavioural, emotional, and cognitive engagement. In practical terms, students with stronger efficacy beliefs tend to participate more actively in classroom discussions, sustain attention during lessons, apply deeper learning strategies, and persist when confronted with academic challenges. The magnitude of this coefficient reflects a moderate motivational transmission effect, suggesting that self-efficacy operates as a proximal determinant of engagement behaviours. This finding is consistent with motivational theory, which posits that students' beliefs about their abilities directly influence their effort, persistence, and involvement in learning activities. Importantly, the direct effect of formative feedback on student engagement remained statistically significant even after accounting for self-efficacy ($\beta = 0.159$, CR = 4.15, $p < .001$). This indicates that the mediation is partial rather than full. Conceptually, this means that formative feedback influences engagement through multiple pathways. While a substantial portion of its effect operates indirectly through the strengthening of self-efficacy, feedback also exerts a direct influence on engagement independent of efficacy beliefs. This direct pathway may reflect additional mechanisms such as increased clarity of expectations, enhanced perception of teacher support, improved task understanding, or emotional reassurance. The persistence of this direct effect suggests that engagement is multidetermined and that self-efficacy, although central, does not exhaust the explanatory process linking feedback to engagement.

The bootstrapped indirect effect was statistically significant ($\beta = 0.106$, 95% CI [0.062, 0.154]), confirming the mediating role of self-efficacy. Notably, approximately 40% of the total effect of formative feedback on student engagement was transmitted through self-efficacy. This proportion mediated indicates that nearly half of the motivational impact of feedback operates by enhancing students' beliefs in their own academic competence. This is substantively meaningful. It suggests that improvements in engagement resulting from high-quality formative feedback are not merely compliance-based responses to teacher directives but are deeply rooted in strengthened self-beliefs. The mediation effect size ($f^2 = 0.12$) falls within the small-to-moderate range, which is considered meaningful in complex psychological models involving multiple determinants of behaviour. The total standardised effect of formative feedback on engagement ($\beta = 0.265$, $p < .001$) reflects a moderate overall influence. Furthermore, the model explained 30.2% of the variance in student engagement ($R^2 = 0.302$). Explaining nearly one-third of engagement variance in a culturally diverse educational context is both statistically and practically significant. Given that engagement is influenced by numerous contextual, relational, and psychological factors, the model demonstrates substantial predictive strength and theoretical coherence.

Theoretically, these findings provide empirical support for the centrality of self-efficacy within Social Cognitive Theory. Feedback functions not only as academic information but as motivational input that shapes learners' beliefs about their competence. The results confirm that engagement is partly belief-driven and that self-efficacy represents a key transmission mechanism linking instructional practice to student behaviour. At the same time, the presence of partial mediation acknowledges theoretical complexity and leaves room for additional motivational variables that may also contribute to the feedback–engagement relationship. Practically, the findings underscore the importance of designing feedback that builds students' confidence and reinforces their sense

of capability. Teachers should provide feedback that emphasises progress, highlights specific strategies for improvement, and communicates belief in students' potential. In culturally diverse Ghanaian classrooms, where students' interpretations of feedback may be shaped by contextual and relational norms, efficacy-supportive feedback practices may be particularly crucial for sustaining engagement across different socio-cultural settings.

Table 3: Model Fit Indices for SEM

Fit Index	Value	Threshold
Chi-Square	198.750	p > 0.05*
CFI	0.946	> 0.90
TLI	0.934	> 0.90
RMSEA	0.045	< 0.06

p=0.05; CI=95%

The SEM model in Table 3 demonstrated a good fit to the data based on widely accepted criteria (Hu & Bentler, 1999). The CFI (0.946) and TLI (0.934) exceeded the threshold of 0.90, and RMSEA (0.045) was well below the 0.06 cutoff, further affirming the robustness of the mediation model.

Research Question 3: How do cultural contexts (e.g., ethnic, linguistic, or regional background) influence the relationship between formative feedback, self-efficacy, and student engagement?

The third research question focused on whether cultural contexts, specifically students' ethnic, linguistic, and regional backgrounds, moderated the relationships among formative feedback, self-efficacy, and student engagement. Recognising the cultural and educational diversity across Ghana, the study examined whether the strength or direction of these relationships differed significantly across regions or between urban and rural ethnic communities. A moderated regression analysis was conducted to assess the interaction effects between formative feedback and the identified cultural variables. The aim was to uncover context-specific dynamics that could inform culturally responsive teaching practices. The results of this analysis are detailed in Table 4.

Table 4: Moderated Regression Analysis of Cultural Contexts

Cultural Context	Interaction Term	Beta	Standard Error	95% CI Lower	95% CI Upper	p-value
Region (Greater Accra)	Formative Feedback × Region	0.125	0.061	0.007	0.243	0.043
Region (Ashanti)	Formative Feedback × Region	0.040	0.070	-0.097	0.177	0.563
Ethnicity (Urban)	Formative Feedback × Ethnicity	0.081	0.055	-0.026	0.188	0.147
Ethnicity (Rural)	Formative Feedback × Ethnicity	0.059	0.062	-0.062	0.180	0.341

p=0.05; CI=95%

In Table 4, the moderated regression analysis examined whether specific cultural contexts defined by region and ethnicity altered the strength of the relationship between formative feedback and student engagement. The analysis focused on interaction terms representing combinations of formative feedback and each cultural variable. Among the four interaction terms analysed, only the interaction between formative feedback and the Greater Accra region reached statistical significance ($\beta = 0.125$, $p = 0.043$). This finding suggests that the positive effect of formative feedback on student engagement was significantly stronger for students in the Greater Accra region compared to their peers in other regions. This could be attributed to several contextual factors unique to the Greater Accra area, including relatively better-resourced schools, exposure to more modern or participatory teaching methods, and the predominance of English as the medium of instruction, all of which may enhance the clarity, relevance, and reception of formative feedback. Students in this region may be more accustomed to dialogic forms of teacher-student interaction, thus making them more responsive to feedback practices.

In contrast, the interaction terms for the Ashanti region ($\beta = 0.040$, $p = 0.563$), urban ethnic groups ($\beta = 0.081$, $p = 0.147$), and rural ethnic groups ($\beta = 0.059$, $p = 0.341$) were not statistically significant. These results indicate that, in these contexts, cultural background did not significantly alter the strength of the relationship between formative feedback and student engagement. It is possible that in these settings, the influence of formative feedback on engagement operates in a more uniform way, or that other contextual factors such as teacher quality, curriculum implementation, or socio-economic challenges may overshadow the role of cultural nuances in moderating this relationship. Overall, the results support the idea that regional cultural context, more so than ethnicity, can shape the effectiveness of formative feedback in engaging students. This finding aligns with principles of culturally responsive education, which emphasise the need for feedback and teaching strategies to be tailored to the specific socio-cultural realities of learners (Gay, 2010). It suggests that educational interventions aimed at improving student engagement through feedback may benefit from region-specific adaptations rather than one-size-fits-all approaches.

Table 5: Mediation and Moderation Effects of Self-Efficacy and Cultural Context on the Relationship Between Formative Feedback and Student Engagement

Path / Analysis	Estimate (β)	Standard Error	95% CI Lower	95% CI Upper	p-value	Effect Size
Formative Feedback → Self-Efficacy	0.432	0.045	0.344	0.520	<0.001	Moderate
Self-Efficacy → Student Engagement	0.251	0.036	0.179	0.323	<0.001	Small-to-Moderate
Formative Feedback → Student Engagement (Direct)	0.162	0.039	0.085	0.239	<0.001	Small
Indirect Effect (Formative Feedback → Self-Efficacy → Engagement)	0.108	0.024	0.062	0.154	<0.001	Small-to-Moderate
Moderation: Formative Feedback × Greater Accra Region	0.125	0.061	0.007	0.243	0.043	Small
Moderation: Formative Feedback × Ashanti Region	0.040	0.070	-0.097	0.177	0.563	Negligible
Moderation: Formative Feedback × Urban Ethnicity	0.081	0.055	-0.026	0.188	0.147	Small
Moderation: Formative Feedback × Rural Ethnicity	0.059	0.062	-0.062	0.180	0.341	Small

N*otes:*

- *Effect sizes are interpreted using Cohen's (1988) benchmarks: small (0.10), moderate (0.30), large (0.50).*
- *Indirect effects are derived from bootstrapped SEM estimates.*
- *Moderation effects represent interaction terms between formative feedback and regional/ethnic variables.*
- *Measurement invariance across regions was not tested, which may influence the interpretation of regional moderation effects.*

The results indicate that formative feedback is positively associated with self-efficacy, with a moderate effect size ($\beta = 0.432$, $p < 0.001$). Self-efficacy, in turn, positively predicts student engagement, with a small-to-moderate effect size ($\beta = 0.251$, $p < 0.001$), confirming its role as a partial mediator. The direct effect of formative feedback on student engagement remains significant ($\beta = 0.162$, $p < 0.001$), while the indirect effect via self-efficacy is also significant ($\beta = 0.108$, 95% CI [0.062, 0.154], $p < 0.001$), indicating that self-efficacy accounts for part of the relationship between feedback and engagement but does not fully explain it. Moderation analyses revealed that regional context influences the feedback-engagement relationship. Specifically, the interaction between formative feedback and the Greater Accra region was significant ($\beta = 0.125$, $p = 0.043$), suggesting that students in this urban and well-resourced region benefit more from formative feedback in terms of engagement. Other moderation terms, including Ashanti region

and urban/rural ethnicity, were not statistically significant, indicating that, in these contexts, the effect of formative feedback on engagement does not vary meaningfully across these cultural dimensions. These findings highlight that while self-efficacy is a critical psychological mechanism linking formative feedback to engagement, the broader socio-cultural and regional context also shapes the effectiveness of feedback. However, the absence of measurement invariance testing across regions limits strong claims about regional differences, and further research using longitudinal or multi-informant designs is needed to validate these effects.

Discussions

This study explored the interplay between formative feedback, self-efficacy, and student engagement among junior high school students in culturally diverse classrooms in Ghana. The findings offer important insights into the psychological mechanisms that underpin engagement in classroom settings, particularly within contexts characterised by cultural and regional heterogeneity. The results from Research Question 1 indicated a significant positive relationship between formative feedback and student engagement ($r = 0.273$, $p < .01$). This finding is consistent with the literature emphasising the motivational and behavioural benefits of timely, constructive feedback in promoting learner engagement (Black & Wiliam, 2009; Hattie & Timperley, 2007). When students receive feedback that is targeted, specific, and process-oriented, they are more likely to perceive it as an opportunity for growth, which in turn fosters greater involvement in academic tasks (Shute, 2008). In the Ghanaian context, where instructional practices can vary widely depending on school resources, teacher training, and class size, the provision of effective feedback becomes even more critical. The moderately high levels of student engagement reported may reflect the positive impact of teachers' use of formative assessment strategies, such as oral comments, checklists, and rubrics, which are increasingly emphasised in Ghana Education Service training manuals (GES, 2021).

The second research question addressed whether self-efficacy mediated the relationship between formative feedback and student engagement. The SEM results confirmed that self-efficacy partially mediated this relationship, with a significant indirect effect ($\beta = 0.108$, $p < .001$). This suggests that formative feedback enhances students' beliefs in their academic capabilities, which in turn leads to greater engagement. This finding aligns with Bandura's (1997) Social Cognitive Theory, which posits that self-efficacy is a key determinant of motivation and action. Consistent with previous research (Zheng et al., 2020; Usher & Pajares, 2008), this study affirms that feedback does not function in a vacuum but works through learners' internal beliefs. Students who perceive themselves as capable and competent are more likely to act on feedback constructively and demonstrate persistence in learning. This reinforces the idea that formative feedback should not only focus on task correction but also support the development of learner confidence and self-perception.

The third research question investigated the extent to which cultural factors such as region and ethnicity moderated the relationships among the study variables. Interestingly, only students from the Greater Accra region showed a statistically significant interaction effect, suggesting that regional context influenced how formative feedback impacted engagement. This finding echoes the work of Hofstede (2001), who emphasised the role of cultural dimensions (e.g., power distance,

collectivism) in shaping learner-teacher interactions. Greater Accra, being the most urbanised and educationally resourced region, may afford students more exposure to formative assessment techniques, learner-centred teaching, and differentiated instruction. Such exposure can enhance the receptivity and utility of feedback. In contrast, in more rural or less resourced areas, large class sizes and teacher-centred pedagogies may constrain the implementation and effectiveness of formative assessment, thereby weakening its impact on engagement (Akyeampong, 2017). These results underscore the importance of culturally responsive pedagogy (Gay, 2010) in Ghanaian classrooms. Teachers must be trained not only in assessment literacy but also in how to adapt feedback strategies to diverse linguistic, ethnic, and regional student profiles.

To strengthen the theoretical grounding of the study, the findings can be interpreted through the lens of culturally responsive pedagogy and sociocultural learning theory. Culturally responsive pedagogy emphasises the need for teaching practices, including feedback, to be attuned to students' cultural knowledge, values, and learning experiences (Gay, 2010). In Ghanaian classrooms, this entails recognising linguistic diversity, local learning norms, and community-based understandings of authority and effort. Similarly, sociocultural learning theory (Vygotsky, 1978) highlights that learning occurs through social interaction and is mediated by culturally shaped tools, language, and practices. From this perspective, formative feedback is not simply an instructional input but a socially and culturally embedded practice whose effectiveness depends on the alignment between teachers' guidance and students' cultural and cognitive frameworks. Integrating these perspectives underscores that engagement emerges not only from individual self-efficacy but also from the interaction between learners and culturally responsive classroom environments, offering a more nuanced explanation for why students in urban regions such as Greater Accra may respond differently to feedback compared to peers in rural or less resourced contexts.

Conclusions

This study set out to explore the intricate relationship between formative feedback and student engagement in culturally diverse junior high school classrooms in Ghana, with particular attention to the mediating role of self-efficacy and the moderating influence of cultural contexts such as region, ethnicity, and linguistic background. Drawing on social cognitive theory and the principles of formative assessment, the findings demonstrate that formative feedback has a significant and positive influence on student engagement. This relationship, however, is not direct alone it is partly mediated by students' self-efficacy beliefs, which in turn significantly enhance their engagement in learning activities. Furthermore, the study highlighted that cultural context, especially regional differences, plays a meaningful role in shaping how feedback is interpreted and acted upon by students. Notably, students from the Greater Accra region demonstrated stronger feedback-engagement pathways, suggesting that urban schooling environments, with their relatively greater access to resources and teacher training, may amplify the effectiveness of formative assessment strategies. These findings confirm the importance of contextually grounded educational practices and provide empirical support for the integration of psychological constructs like self-efficacy in assessment design and delivery. Taken together, the findings underscore the idea that formative assessment is more than a pedagogical tool; it is a motivational lever, a confidence builder, and a

culturally mediated practice. In the Ghanaian educational context, where classrooms are increasingly diverse and equity remains a critical goal, designing feedback systems that build student efficacy and acknowledge contextual realities can contribute meaningfully to improving academic engagement and learning outcomes.

Recommendations

Given the evidence generated by this study, it is imperative that professional development for teachers incorporates a strong focus on formative feedback practices. Such training should not be generic but should instead emphasise how feedback can enhance students' self-belief and how its delivery should be sensitive to students' cultural and linguistic backgrounds. Teachers must be equipped not just with feedback strategies, but with the skills to differentiate these strategies to suit learners' individual needs and contexts. Educational policy makers, including the Ghana Education Service and the National Council for Curriculum and Assessment, must also prioritise culturally responsive assessment practices in curricular reforms and teacher education. This means moving beyond a one-size-fits-all model to one that recognises regional disparities in resources, language use, and cultural attitudes toward learning and authority. In doing so, formative feedback will not only correct academic misunderstandings but will also affirm identity, inspire confidence, and foster inclusive learning environments. School leaders and head teachers should create enabling environments that support the systematic use of formative feedback. This may include facilitating peer learning communities among teachers to share best practices, allocating time for formative assessment in classroom schedules, and using school-based in-service training sessions to reinforce assessment-for-learning principles. Additionally, curriculum developers should embed self-efficacy-enhancing strategies into instructional materials and textbooks. These strategies may include goal-setting activities, reflective journals, opportunities for peer modelling, and structured opportunities for students to respond to feedback iteratively. When embedded into classroom culture, such practices can contribute to sustained engagement and long-term academic growth. Further, a stronger research agenda should be cultivated to continue examining these constructs across diverse contexts within Ghana and beyond. Longitudinal studies, classroom-based interventions, and mixed-method approaches can help deepen understanding of how formative assessment functions across time, subjects, and schooling systems.

Implications for Practice

The findings from this study present compelling implications for classroom practice, teacher education, and broader educational reform in Ghana. For classroom teachers, the study suggests that formative feedback is most effective when it not only provides students with corrective information but also enhances their belief in their own academic capabilities. Teachers should, therefore, approach feedback as an opportunity not just to teach content, but to cultivate learner confidence and motivation. This demands a shift from traditional, directive forms of feedback to dialogic, constructive, and student-centred forms. School leaders must recognise the institutional conditions that enable or constrain effective formative feedback. These include manageable class sizes, adequate instructional materials, and time for individualised feedback. Leadership practices that support teacher collaboration and reflective practice can foster a school-wide culture where assessment is embedded in the learning process rather than relegated to end-of-term exams. In the

domain of teacher preparation, colleges of education and universities must revise their curricula to include targeted instruction on motivational theory, self-efficacy, and culturally responsive pedagogy. Pre-service teachers should be given both theoretical knowledge and practical experience in designing and implementing formative feedback strategies in real classroom settings. This will ensure that beginning teachers enter the profession with the skills and dispositions necessary to engage all learners meaningfully. Curriculum reformers must also take heed of the findings. Assessment guidelines and textbooks should be written in ways that make space for formative feedback and embed culturally relevant examples. Formative assessment must be presented not just as a tool for grading or tracking, but as an integrated part of the teaching and learning cycle that reflects students' contexts and enhances their potential.

Limitations of the study

It is important to note that the cross-sectional design of this study limits the ability to make causal inferences. While the structural equation model was specified in a directional manner, the results should be interpreted as evidence of association rather than causation. The observed relationships among formative feedback, self-efficacy, and student engagement may be reciprocal or influenced by unmeasured contextual factors. For example, students with higher engagement may elicit more feedback from teachers, or students with stronger self-efficacy may perceive feedback more positively. Consequently, statements implying that feedback "enhances" self-efficacy or "leads to" engagement should be framed as theoretical interpretations of associational data rather than confirmed causal effects. Future research employing longitudinal or experimental designs is needed to examine the temporal sequencing and potential reciprocal pathways among these variables.

Another limitation of this study relates to measurement and potential common method bias. All key constructs, formative feedback, self-efficacy, and student engagement were assessed using student self-report questionnaires administered at a single time point. This approach may inflate associations due to shared method variance or perceptual biases, as students' responses could be influenced by their general mood, social desirability, or individual response tendencies. The absence of methodological triangulation, such as teacher evaluations, classroom observations, or document analysis, may limit the robustness and construct validity of the findings. As a result, the reported relationships should be interpreted with caution, recognising that part of the observed associations may reflect common reporting sources rather than purely theoretical linkages. Future studies could strengthen validity by incorporating multiple informants and diverse data sources to mitigate potential biases and provide a more comprehensive understanding of the mechanisms linking formative feedback, self-efficacy, and engagement.

Declarations

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Compliance with Ethical Standards

This study was conducted in accordance with the ethical standards of the University of Education, Winneba (UEW)-Ghana. It also adhered to the principles outlined in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. All procedures involving human participants were carried out in line with institutional and international guidelines for ethical research.

Conflict of Interest

The author declares that there are no conflicts of interest, financial, personal, or professional, that could be perceived to influence the findings or interpretation of this research.

Informed Consent

Informed consent was obtained from all participants involved in the study. Participants were fully informed about the purpose, procedures, potential risks, and benefits of the study. They were assured of the voluntary nature of their participation and their right to withdraw at any time without penalty. Where applicable, parental or guardian consent was also obtained for participants under the age of 18. The confidentiality and anonymity of all respondents were strictly maintained throughout the research process.

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