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The Mediating Role of Academic Interest in the Relationship between Changes in the Perceived Psychosocial Classroom Learning Environment and Changes in Academic Achievement in Mathematics among Secondary School Students

Flavia Jenina Asingwire[1], Dr. Sudi Balimuttajjo (PhD) [1] Dr. Stephen Ndawula (PhD) [2] Dr. Henry Kariisa Ampeire (PhD)[3]
[1]Mbarara University of Science and Technology
[2]Kyambogo University
[3]Makerere University

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Abstract

Purpose; This study examined the mediating role of academic interest in the relationship between perceived psychosocial classroom learning environment and Mathematics achievement among secondary school students in the Greater Mbarara Region, Uganda.

Methodology: Guided by a post-positivist paradigm, the study employed a longitudinal mixed-methods quasi-experimental design without intervention to examine naturally occurring changes over time. The study involved 448 Senior Three students, 23 Mathematics teachers, and 8 head teachers from eight secondary schools. Quantitative data were collected using the What Is Happening In this Class (WIHIC) questionnaire and curriculum-based Activities of Integration Mathematics tasks administered at baseline and end-line over an eight-week period. Qualitative data were collected through interviews and focus group discussions. Quantitative data were analysed using descriptive statistics, paired-sample t-tests, correlation, multiple regression, and mediation analysis, while qualitative data were thematically analysed.

Findings: The findings revealed that changes in academic interest fully mediated the relationship between changes in the classroom learning environment and Mathematics achievement. The direct effect became non-significant after including academic interest ($\beta = -.049$, $p = .358$), whereas the indirect effect remained significant (Sobel $z \approx 6.00$, $p < .001$). Qualitative findings showed that teacher support, group work, supervision, and equitable participation improved learning outcomes when they promoted students' interest, confidence, and emotional engagement with Mathematics.

Recommendations; The study demonstrated that academic interest fully mediates the relationship between the classroom learning environment and academic achievement. Therefore, interventions should prioritize nurturing students' academic interest through positive emotions, real-life applications of mathematics, and meaningful, challenging learning tasks. Improving classroom conditions is likely to enhance achievement when they first stimulate learners' interest in mathematics.

Keywords: *Perceived Psychosocial Classroom learning environment, Academic Interest, Academic achievement*

JEL Classification: *I21; I24; I28*

Introduction

Mathematics has historically played a vital role in education and societal development from the pre-colonial era to the modern age. Early mathematical skills involved counting, writing numbers, and practical applications in trade, agriculture, and construction across civilizations such as Greece, Egypt, Arabia, and Africa (Adenusi, 2014; David, 2011; Eberhart, 2002). During the Renaissance, Mathematics expanded into arithmetic, algebra, geometry, and astronomy to support commerce and navigation (Huylebrouck, 2006; O'Connor & Robertson, 2000). As a result of global transformation, changes have shifted achievement to scores such as grades. Despite educational advancements, studies in Europe (e.g., Netherlands and Czechoslovakia) reported declines in mathematics performance, where students show basic knowledge but struggle with application and reasoning, including Uganda and other African nations (Zhai & Pellegrino, 2023; Mullis & Kelly, 2022). In East Africa, Mathematics achievement has remained a concern, with Tanzania reporting a Form Four pass rate of about 16% and Kenya recording substantial failure, with 50% of candidates obtaining a mean grade of 'E' (Kihwele &Mkomwa, 2022; Kihwele and Mkomwa (2022). In Uganda, low Mathematics achievement has similarly persisted, with 64.62% of UCE candidates attaining pass or below in 2023 (UNEB, 2023). These challenges highlight the importance of improving the classroom learning environment, which has historically evolved from traditional settings where learners were taught by elders in community spaces to structured classrooms characterized by rows of desks and teacher-centred instruction (Ghonge et al., 2020; Wangia, 2020; Salpaus Further Education., 2018). From the 1980s, classroom arrangements increasingly incorporated group and curved seating to promote interaction, cooperation, and learner participation (Machado, n.d.; Posthumus et al., 2018). In Uganda, however, some schools between the 1980s and 1997 still lacked conducive learning spaces, with learners studying under trees or in semi-structured shelters exposed to rain, heat, dust, and wind (Naigaga, 2019). Despite subsequent efforts to improve mathematics education through qualified teachers and increased resources (Muhangi, 2019), achievement remains low. In Greater Mbarara, inadequate infrastructure, limited resources, overcrowding, and persistent poor performance in Isingiro, Rwampara, Kiruhura, and Kazo continue to raise concern (Rosemary, 2024; Beteth et al., 2024; Arap, 2021; Nabireeba, 2018), underscoring the need to examine whether academic interest mediates the relationship between the psychosocial classroom learning environment and Mathematics achievement.

Academic interest refers to learners' sustained engagement, perceived value, and motivation toward learning activities (Hidi & Ann Renninger, 2006). It develops through interactions with the learning environment and influences students' attention and persistence in learning (Adu-(Adu-Gyamfi, 2013;Wu et al., 2019). In this study, academic interest is measured through the dimensions of emotion, value, knowledge, and engagement (Luo et al., 2019; (Kisakye, 2025).

Statement of the Problem

Effective Mathematics teaching and learning are essential for preparing learners to contribute meaningfully to a nation's social and economic development, with academic excellence serving as a key yardstick for achieving this goal (Abín et al., 2020). Despite efforts to improve Mathematics performance, many learners continue to exhibit low academic interest and poor achievement (Niyazova et al., 2022). For instance, In the 2024 UCE examination, approximately 55.2% of Mathematics candidates attained the Basic level (D), 23.3% attained the Satisfactory level (C), 14.9% attained the Outstanding level (B), and only 3.8% attained the Exceptional level (A), while 2.8% remained at the Elementary level (E). Thus, although 97.2% attained at least the basic level, only 42.0% attained satisfactory competency or above. In 2025,

22.8%, 62.0%, 10.9%, and 2.7% were in outstanding, satisfactory, basic, and elementary levels respectively, with only 1.5% achieving excellent/exceptional performance (Uganda National examination Board, 2026). Although previous studies have examined the relationship between classroom environment and academic achievement, the mediating role of academic interest reflected in learners' emotional engagement, perceived value, knowledge and active participation, remains underexplored, particularly in the Ugandan context (Luo et al., 2019;Ogbuanya et al., 2017). (Barksdale et al., 2021; Wang et al., 2024). Failure to understand this mediation process limits the development of effective interventions aimed at improving Mathematics achievement.

The purpose of this study therefore was to assess the mediation of academic interest on the relationship between changes in the perceived psychosocial classroom learning environment and changes in academic achievement in Mathematics among secondary school students in Greater Mbarara Region.

Theoretical Review

From a theoretical perspective, the full mediation effect observed in this study is strongly supported by Social Cognitive Theory (SCT) as articulated by Bandura (1986). SCT posits that environmental influences affect learning outcomes by shaping learners' cognitive, motivational, and affective processes. The full mediation effect is supported by Albert Bandura's Social Cognitive Theory, which posits that environmental influences affect achievement through learners' cognitive and motivational processes (Bandura, 1991). In this study, classroom learning environment dimensions appear to influence mathematics achievement primarily by fostering academic interest, which serves as an internal mechanism translating environmental experiences into sustained effort and performance. The disappearance of the direct effect after including academic interest is therefore consistent with SCT's emphasis on the role of cognitive and affective processes in translating environmental influences into behaviour (Bandura, 1986,). Similarly, Self-Determination Theory (SDT) suggests that supportive learning environments promote autonomy, competence, and relatedness, thereby strengthening learners' intrinsic motivation and interest that drives academic achievement (Ryan & Deci, 2000). In his study, teacher support, equity, involvement, and task orientation may enhance achievement indirectly by increasing academic interest, which encourages persistence, effort, and engagement in mathematics.

Literature Review

This review examines empirical evidence on the mediating role of academic interest in the relationship between classroom learning environment and mathematics achievement. Academic interest, reflected in students' emptions, engagement, knowledge and value for mathematics, has been identified as an important mediator that helps explain how positive classroom experiences contribute to improved academic outcomes. The study defines academic interest as learners' sustained emotional engagement and tendency toward learning activities and ideas within their learning environment (Hidi & Ann Renninger, 2006) Several studies consistently demonstrate that academic interest, engagement, value, emotions, and related psychological constructs mediate the relationship between the classroom learning environment and academic achievement. For instance, Shernoff (2016) and Tosto et al. (2016) found that student engagement and subject interest mediated the effect of environmental support on learning outcomes and academic achievement, indicating that classroom conditions influence achievement indirectly through learner involvement. Similarly, Ma and Wei (2022) reported that student engagement partially mediated the relationship between perceived teacher support

and academic performance, while Kaku and Arthur (2025) confirmed that students' academic interest significantly mediated the relationship between the mathematics classroom environment and academic achievement. In the same line, Yang et al. (2021) established that students' behavioral engagement mediated the relationship between teachers' emotional support and mathematics performance, reinforcing engagement as a key explanatory mechanism. Further, Boadu et al., (2021) and Tosto et al. (2016) found that academic interest fully mediated the relationship between teacher quality, classroom environment, and mathematics achievement, suggesting that classroom influence operates primarily through students' interest formation.

Beyond engagement and interest, additional evidence highlights the role of value, emotions, and self-efficacy as mediators Zalizan et al. (2016) found that academic engagement mediated the relationship between parental, teacher, and student support and academic achievement, serving as the strongest indirect pathway. Likewis, ,Lin et al., (2020) reported that learning engagement and learning anxiety jointly mediated the relationship between class competition and academic achievement, showing that both positive and negative emotional states contribute to learning outcomes. In mathematics education, Phan and Ngu (2018) and (Liu, Wang, Ding et al., 2022) demonstrated that academic interest and perceived value mediate the relationship between teacher-student interaction, classroom environment, and achievement. Similarly, (Peşman et al., 2024) found that perceived value of mathematics mediated the relationship between constructivist learning environments and STEM achievement, highlighting cognitive appraisal as a key mechanism.

Emotional pathways also play a significant mediating role. Yu et al. (2020). and Lin et al., (2020) found that learner emotions such as enjoyment, anxiety, and boredom mediate the relationship between classroom interaction styles and learning persistence as well as mathematics outcomes. Additionally, Ren et al. (2022) reported that positive academic emotions mediate the relationship between teacher support and academic self-efficacy, thereby strengthening performance outcomes. Collectively, these findings confirm that classroom learning environments influence academic achievement through multiple interconnected psychological pathways, particularly academic interest, engagement, value, and emotions.

Although previous studies provide important evidence on the relationships between classroom learning environment, academic interest, and Mathematics achievement, most have examined these relationships at a single point in time. Limited research has investigated how changes in these variables unfold and relate to one another over time, particularly among secondary school students in Greater Mbarara Uganda. This gap in longitudinal evidence provided the rationale for the present study's focus on changes between baseline and end-line in Greater Mbarara. Besides, there are limited studies that have statistically tested the mediating reffect, hence need for study.

Methodology

Research Paradigm

This study was guided by the post-positivist worldview, which assumes that reality exists independently of human perception but can only be imperfectly understood, and Knowledge is viewed as provisional and subject to falsification; therefore, researchers rely on empirical observation and theory testing while acknowledging the possibility of error (Hendrawijaya, 2022; Creswell & Creswell, 2017; Panhwar et al., 2017; Popper, 2005). Consistent with this paradigm, the study adopted a longitudinal quasi-experimental design without intervention. The design was appropriate because randomization was not feasible (Rogers & Revesz, 2019).

A mixed-methods approach to examine changes in the psychosocial classroom learning environment and their relationship with students' academic interest and achievement in mathematics among Senior Three (S.3) students (Maciejewski, 2020; Miller et al., 2020). Methodological triangulation was achieved through questionnaires, interviews, and focus group discussions, while ANOVA and mediation analysis were used to examine relationships among variables (Kivunja et al., 2017;Creswell & Creswell, 2017; Rogers & Revesz, 2019).

Study Area and Context

The study was conducted in selected secondary schools within the Greater Mbarara region in southwestern Uganda, comprising the districts of Isingiro, Kiruhura, Kazo, and Rwampara (Mukombozi & Ainebyoona, 2023). These districts were purposively selected due to consistently low performance in mathematics as reported in national and regional assessments (Manyiraho et al., 2020). Similar trends were observed in mock examinations, with 56.6%–84.6% of students in the selected districts performing below average (ASSHU, 2024; asshuankole.com; (Beteth et al., 2024).; Arap, 2021). The region presents diverse educational contexts, including both rural and semi-urban schools, with challenges such as large class sizes, limited instructional resources, and variability in teacher quality (FAO, 2018). These contextual factors provide a relevant basis for examining classroom environment effects on student outcomes, justifying a focused study on classroom dynamics in the selected secondary schools.

Study Population

The study population comprised secondary school students studying Mathematics in selected secondary schools in Greater Mbarara Region. The target population consisted of Senior Three (S.3) students enrolled in secondary schools in the Greater Mbarara region, along with their mathematics teachers and head teachers. The quantitative sample size was determined using G*Power for multiple regression analysis, with parameters set at a small to medium effect size ($f^2 = 0.03$), alpha level ($\alpha = .05$), and five predictors. The final sample comprised 448 Senior Three (S.3) students who completed all data collection stages (pre- and post-questionnaires and mathematics tests); incomplete responses were excluded to ensure a valid dataset and minimize Type II error due to under-sampling (Faul et al., 2007). Focus group discussions involve in-depth group interaction on participants' views ideas (Van Eeuwijk & Angehrn, 2017). Four FGD (eight gender-balanced students each) were conducted in randomly selected government and private schools, alongside interviews with 23 teachers and 8 head teachers from eight schools, whose input complemented student data and enhanced credibility through triangulation.

Table 1: Sampling Technique, Sample Size and Activities Conducted Per School

Participant Category	Sample size	Sampling Technique	Number of schools proposed	Government Schools	Private schools	Activity
Students	448	G*Power	4	2	2	Filling questionnaire
Students	32	Class-list based-on gender	4	2	2	Focus Group Discussion
Teachers	23	Purposive	4	2	2	Interview
Head-teachers	8	Purposive	4	2	2	Interview

Data Collection

The study was conducted in the months of February, March and June 2025 when the sample schools were visited. Data were collected using self-administered questionnaires distributed to 448 students across eight selected secondary schools in two phases: a pre-test (baseline questionnaires and mathematics assessment) and a post-test after 8 weeks (re-administration and follow-up achievement test). Qualitative data were collected concurrently through interviews and four focus group discussions. Mathematics achievement was further assessed using validated tasks developed by UNEB examiners in collaboration with teachers, administered after topic coverage, with resulting scores used to determine learners' academic achievement. Data was collected by use of a questionnaire for students and interview guide for teachers, headteachers and selected students. The psychosocial classroom environment was measured using the What Is Happening In this Classroom (WIHIC) questionnaire. Responses were measured on a 5-point Likert scale ranging from 1 (Almost Never) to 5 (Almost Always) (Skordi & Fraser, 2018). The study examined teacher support, learner involvement, cooperation, and task orientation. An interview protocol is a data-collection tool that provides guidelines and structure for conducting interviews (Turner, 2017; Castillo-Montoya, 2016). Qualitative data were collected using an interview protocol in which, Semi-structured interview guides were used for teachers and head teachers, while focus group discussion guides were used for students. These provided structured questions and guidelines for conducting the interviews. Academic achievement was assessed using Activity of Integration (AOI) mathematics tasks**,** aligned with the national curriculum. Scores were standardized and categorized based on national grading frameworks scale as follows: Outstanding (2.5-3.0), Moderate (1.5-2.4), and Basic (0.1-1.4) (Kisakye, 2025).

Quality Control

Validity was ensured through expert review, yielding a Content Validity Index (CVI) of 0.8935, indicating acceptable validity (Kimberlin & Winterstein 2008; Zamanzadeh et al. 2015). Reliability, established via a pilot study using the modified WIHIC scale, showed satisfactory internal consistency (Cronbach's $\alpha = 0.848$) (Ahmad et al., 2024)

Data Collection Procedure

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Data Analysis

Quantitative data were analysed using IBM SPSS Statistics Version 26. Descriptive statistics-frequencies, percentages, means, and standard deviations, were computed to summarize and describe the main features of the data in a clear and meaningful manner (Blbas, 2024).

Inferential analyses included paired-sample t-tests to compare pre- and post-test means within the same group, two-way Analysis of Variance (ANOVA) to examine differences between variables, and multiple regression analysis to assess the predictive relationships among variables (Kim et al., 2024).. Prior to these analyses, assumptions were tested: normality was assessed using skewness and kurtosis (within ±1), while multicollinearity (VIF < 10, tolerance > 0.2), linearity, and homoscedasticity were evaluated through residual plots. Mediation analysis followed Baron and Kenny mediation model (1986) using a four-step procedure, with confidence intervals was computed for indirect effects. Further confirmation of mediation effects was conducted using Med-Graph path analysis (Jose, 2013).

Qualitative data were analysed thematically through transcription, coding, theme development, and interpretation. The qualitative findings were triangulated with quantitative results to enhance the validity and comprehensiveness of the study.

Results and Discussion

Mediation of Academic Interest on the Relationship between Psychosocial Classroom Learning Environment and Mathematics Achievement

The mediation analysis was run using Baron and Kenny (1986) four-step procedure of mediation and the mediating effect tested using Sobel test. The mediation paths were further run by generating Medgraph Paths Diagram using the Online Medgraph Calculator developed by Jose (2013).

Table 2: Mediating effect of changes in academic interest in the relationship between changes in the Perceived Classroom Environment and Change in Academic Achievement

Step/ Regression	Path	IV	DV	B	SE	Beta	p	Part Corr.	R^2	VIF
1 (IV – DV	a	CLE	AA	.116	.039	.139	.003	.139	.019	1.000
2(IV -- MV)	b	CLE	AI	.458	.034	.535	.000	.535	.286	1.000
3(MV -- DV)	c	AI	AA	.318	.044	.325	.000	.325	.106	1.000
4 (IV&MV -- DV)	c^1	CLE	AA	-.041	.044	-.049	.358	-.041	.107	1.400
	b^1	AI	AA	.344	.052	.351	.000	.297		

Key: CLE=Class Learning Environment; AI=Academic Interest; AA=Academic Achievement; B=Unstandardized Beta; SE=Standard Error; Beta=Standardized Beta; Corr.=Correlation

Tables 2 present analysis results assessing the mediation of changes in academic interest on the relationship between changes in the perceived psychosocial classroom learning environment and in academic achievement, following Baron and Kenny's (1986) four-step mediation procedure developed by the School of Psychology at Victoria University of Wellington (Jose, 2013).

The results indicate that changes in the perceived psychosocial classroom learning environment significantly predicted changes in academic achievement (β = .139, p = .003; Step 1), satisfying the first condition for mediation. This finding was also supported by qualitative evidence from key informants. These findings are consistent with studies reporting a positive relationship between the classroom environment and academic achievement (PPMC = 0.278) (Siega et al., 2020). and evidence that supportive classroom environments enhance student motivation and performance (Nwokedi, 2023). However, contrary findings suggest that perceived subject difficulty can reduce self-confidence and academic achievement(Yin et al., 2020).

Across the interviews, headteachers, teachers, and students are largely aligned in attributing improved mathematics performance to control, accountability, and exam-focused practices.

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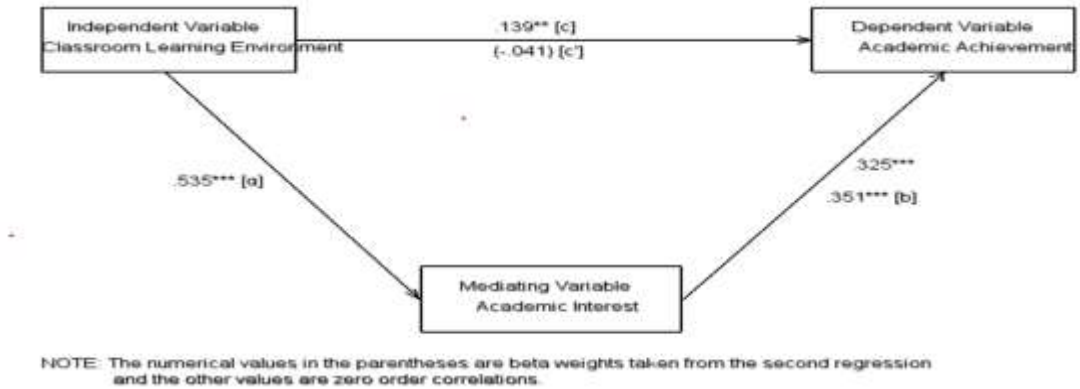
Headteachers emphasize supervision and syllabus coverage, e.g., "regular lesson observations, checking schemes of work and lesson plans" (HT-PC) and "ensuring that the syllabus is fully covered on schedule" (HT-GR1), alongside "strict enforcement of academic policies… compulsory homework" (HT-PC). Teachers similarly highlight exam-oriented strategies such as "Teaching to the test" (T14-GR), "drilling and repetitive practice… even without deep understanding" (T8-GA), and "frequent assessments and feedback." Students also concur, citing "Fear of failure or punishment" (S13-GK1), "desire to pass exams and progress academically," and "memorization and cramming techniques" (S5-GK1).

Consistent with earlier relationship between classroom environment and learning outcomes, the classroom learning environment significantly predicted changes in academic interest (β = .535, p < .001) (Step 2), while academic interest also significantly predicted changes in academic achievement (β = .325, p < .001) (Step 3). When both the perceived psychosocial classroom learning environment and academic interest were entered into the regression model (Step 4), the effect of classroom learning environment on academic achievement became non-significant (β = -.049, p = .358), whereas academic interest remained a significant predictor (β = .351, p < .001), indicating full mediation. This pattern suggests that the classroom learning environment improves academic achievement mainly by enhancing students' academic interest rather than exerting a direct effect.

Significance of Mediation			Significant
Sobel z-value		5.937972	p = < 0.000001
95% Symmetrical Confidence Interval			
	Lower	.10555	
	Upper	.20956	
Unstandardized indirect effect			
	a*b	.15755	
	se	.02653	
Effect size Measures			
	Standardized Coefficients		R^2 Measures (Variance)
	Total:	.139	.022
	Direct:	-.04	.001
	Indirect:	.188	.020
	Indirect to Total Ratio:	0000	.922



Source: Computed using Online Med-graph Calculator (Jose, 2013).

Figure 1: Mediation Paths Showing the Mediating Effect of Changes in Academic Interest on the Relationship between Changes in Classroom Learning Environment and Changes in Academic Achievement

The Med-Graph output shows a statistically significant indirect effect of changes in classroom learning environment on changes in academic achievement through academic interest, as confirmed by a significant Sobel test ($z \approx 6.00$, $p < .001$).

Building on these findings others previous studies identified a similar trend. A study among Chinese middle school students reported that peer relationships influenced academic achievement both directly and indirectly through learning motivation, indicating a partial mediation effect, which contrasts with the full mediation found in the present study (Shao et al., 2024). Similarly, subsequent studies have demonstrated that the classroom learning environment is significantly related to mathematics academic achievement, with subject interest acting as a significant partial mediator of this relationship (Tosto et al., 2016). Similarly, Barbarona and Montejo, (2024). found that knowledge partially mediated the relationship between the classroom learning environment and students' interest in mathematics. In conclusion, although previous studies reported partial mediation, the present study found full mediation, indicating that classroom learning environment influences academic achievement entirely through the mediating variable. This suggests a stronger mediating effect in the current context.

Qualitative evidence from headteachers, teachers, and students largely supports the statistical finding of full mediation by academic interest, with only limited views suggesting weak direct effects of classroom practices. Most headteachers five of eight noted that, *"some students consult teachers just for the sake of it, not because they are interested"* (HT-GA), with others adding that *"students fear mathematics and withdraw emotionally"* (HT-PC). Similarly, most teachers-eighteen of twenty-three emphasized that strategies only work with interest, noting that *"learners may participate but still fail to improve if they are not interested"* (T11-GR). Twenty of thirty-two Students echoed this, stating *"even when teachers help us, if we are not interested, we do not improve"* (S6-GA) and *"I only perform well when I feel confident and interested"* (S11-PK), though a few ten of thirty-two mentioned surface engagement such as *"just to avoid punishment"* (S2-GK2). In all, the evidence indicates that academic interest is the key pathway linking classroom learning environment to achievement.

Results and Discussion

The study assessed whether academic interest mediated the relationship between psychosocial classroom learning environment and academic achievement in Mathematics.

Regression analyses showed that the classroom learning environment significantly predicted mathematics achievement before the mediator was introduced. Academic interest then fully mediated this relationship, suggesting that improvements in the learning environment enhanced achievement mainly through increased academic interest.

The findings align with previous studies emphasizing the role of learner task orientation in academic achievement. For instance, (Sainio, 2021) found that learners focused on mastering tasks achieve better outcomes, while , Oribhabor (2020)reported that activity-based instruction improves mathematics performance through greater learner engagement. Similarly, (Usán Supervía et al., 2020) observed that mastery-oriented activities enhance confidence and academic achievement.

The qualitative findings support the role of structured classroom practices in improving achievement. Headteachers and teachers emphasized supervision, syllabus coverage, task monitoring, regular assessments, and feedback as key factors enhancing learner performance. However, students noted that these practices often promoted memorization rather than deep

understanding. This suggests that while instructional structure can improve achievement independently of academic interest, lasting learning requires greater learner engagement and conceptual understanding.

Consistent with the regression analysis, classroom learning environment significantly predicts both academic interest and achievement, but its direct effect on achievement becomes non-significant when academic interest is included, indicating full mediation through academic interest.

While the present study found full mediation, most previous studies reported partial mediation. For instance, learning motivation partially mediated the relationship between peer relationships and academic achievement (Shao et al., 2024), while subject interest partially mediated the effects of the classroom learning environment and teaching quality on mathematics achievement (Tosto et al., 2016; Arthur et al., 2022). Similarly, knowledge partially mediated the relationship between the classroom learning environment and students' interest in mathematics (Barbarona & Montejo, 2024). These findings contrast with the full mediation observed in the present study.

The qualitative findings from headteachers, teachers, and students consistently supported the mediating role of academic interest. Headteachers emphasized that supportive classroom practices improve achievement only when learners develop interest, confidence, and emotional engagement in mathematics, although fear and negative beliefs may weaken this process. Similarly, teachers reported that supportive classroom environments promote confidence, participation, and persistence, but noted that learners who engage without genuine interest show limited improvement. Students likewise indicated that supportive classroom conditions alone do not guarantee better performance unless they feel interested and confident in mathematics. Together, these findings suggest that academic interest is the key mechanism linking classroom environment to academic achievement.

The findings align with evidence that classroom environments influence achievement through learner-related factors. Academic interest and task value mediate the relationship between teacher-student interaction and mathematics achievement (Phan & Ngu, 2018), while perceived value, self-regulation, engagement, and knowledge also serve as important mediators of academic outcomes (Anwar et al., 2025; Asare, 2025; Dong et al., 2020). This supports the mediating role of academic interest found in the present study.

The qualitative findings further contextualized these results. Headteachers emphasized the importance of mathematics for future opportunities but noted that fear and negative experiences often weakened learners' attachment to the subject. Similarly, teachers observed that although learners recognized the value of mathematics, many avoided meaningful engagement. Students echoed this contradiction, acknowledging the importance of mathematics while expressing fear, dislike, and emotional detachment. These findings suggest that valuing mathematics alone is insufficient unless accompanied by interest, confidence, and emotional engagement.

The full mediation effect observed in this study is supported by Social Cognitive Theory (Albert Bandura, 1986, 1997), which posits that environmental influences affect achievement indirectly through cognitive and affective processes, as classroom learning environment dimensions enhance mathematics achievement by fostering academic interest that translates environmental inputs into effort and performance; Self-Determination Theory (SDT) (Edward L. Deci & Richard M. Ryan, 2000), which explains that supportive classroom conditions satisfy learners' needs for autonomy, competence, and relatedness, thereby cultivating academic interest that drives persistence, engagement, and achievement rather than the environment

directly; and Constructive Alignment Theory (John Biggs, 1996, 1999; Biggs & Tang, 2020), which argues that learning outcomes depend on learners' engagement with aligned learning activities and assessments, with academic interest serving as the motivational bridge that enables classroom design to be translated into meaningful academic performance.

Conclusion and Implications

The study concluded that academic interest is a significant mediator between perceived psychosocial classroom learning environment and academic achievement in Mathematics among secondary school students in Greater Mbarara Region. Meaning that classroom conditions influence achievement only indirectly through their effect on students' academic interest. This implies that improving the learning environment alone is not sufficient to enhance achievement unless it also fosters interest in mathematics, which serves as the key mechanism translating classroom conditions into academic outcomes. Therefore, improving psychosocial classroom environments is essential for fostering academic interest and improving Mathematics performance among secondary school students. Therefore, interventions to improve mathematics achievement should prioritize fostering students' academic interest. Teachers should enhance positive academic emotions, link mathematics to real-life contexts, and engage learners in meaningful tasks, since classroom improvements lead to achievement gains only when they first stimulate academic interest.

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Conflict of Interest

None of the authors of this paper has any conflict of interest in this study

Availability of Materials

All the materials used to develop this paper are available and can be availed on request.

Use of generative AI tools

No generative Artificial Intelligence (AI) tools have been used in the development of this paper.

REFERENCES

Abín, A., Núñez, J. C., Rodríguez, C., Cueli, M., García, T., & Rosário, P. (2020). Predicting mathematics achievement in secondary education: The role of cognitive, motivational, and emotional variables. *Frontiers in Psychology*, *11*, 523356.

Adenusi, T. P. (2014). *West African pre-colonial education versus western education in West Africa: Re-enlivening the discourse of pre-colonial education in Africa*.

Adu-Gyamfi, K. (2013). Lack of interest in school science among non-science students at the senior high school level. *Problems of Education in the 21st Century*, *53*(1), 7–21.

Ahmad, N., Alias, F. A., Hamat, M., & Mohamed, S. A. (2024). Reliability analysis: application of cronbach's alpha in research instruments. *Pioneering the Future: Delving into E-Learning's Landscape*, 114–119.

Albert Bandura. (1991). Social Cognitive Theory of Self-Regulation. *Article*, *38*, 248–287.

Alma S. Barbarona and Giovanni A. Montejo. (2024). No TitleThe Mediating Effect of Attitude and Knowledge on Technology on the Relationship Between Classroom Learning Environment and Study Interest in Mathematics. *International Research Journal of Modernization in Engineering Technology and Science*, *6*(6), 2545–2559. https://doi.org/: https://www.doi.org/10.56726/IRJMETS59272

Arap, F. (2021). Rwampara District 2020 UCE Results – Top Best Schools. *Report*.

Barksdale, C., Peters, M. L., & Corrales, A. (2021). Middle school students' perceptions of classroom climate and its relationship to achievement. *Educational Studies*, *47*(1), 84–107.

Beteth1, N., Julius2, D. A., & 1, 2 Metropolitan. (2024). Supervision And Performance Of Teachers In Secondary Schools In Ngarama Sub County Isingiro District. *Metropolitan Journal Of Social And Educational Research*, *Vol. 3*(4,), ISSN: 1813-4270 Vol. 3 199-215.

Biggs, J. (1996a). Enhancing teaching through constructive alignment. *Higher Education*, *32*(3), 347–364.

Biggs, J. (1996b). Enhancing teaching through constructive alignment. *Higher Education*, *32*(3), 347–364.

Biggs, J., & Tang, C. (2020). Constructive alignment: an outcomes-based approach to teaching anatomy. In *Teaching anatomy: A practical guide* (pp. 23–30). Springer.

BOADU, S. K., DOOKURONG, I., & Arthur, Y. D. (2021). The Effect of Teacher Quality on Perceived Students' Mathematics Achievement: The Mediating Role of Technology, Motivation and Student Interest. *Research Report*, 1–51.

Castillo-Montoya, M. (2016). Preparing for interview research: The interview protocol refinement framework. *Qualitative Report*, *21*(5).

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

David M B. (2011). The History of Mathematics. In Stewart K. Mattson (Ed.), *Physics Today* (7th ed., Vol. 10, Issue 9). McGraw-Hill. https://doi.org/10.1063/1.3060495

Eberhart, S. (2002). A Mathematical Look at the 7 Liberal Arts as Humanities. *Bridges: Mathematical Connections in Art, Music, and Science*, 285–292.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191.

Hendrawijaya, A. T. (2022). Effects of Mediation of Learning Interest in Improving Student Learning Achievement. *International Journal of Instruction*, *15*(1), 857–872.

Hidi, S., & Ann Renninger, K. (2006). The four-phase model of interest development. *Educational Psychologist*, *41*(2), 111–127. https://doi.org/10.1207/s15326985ep4102_4

Huylebrouck, D. (2006). Mathematics in (Central) Africa before colonisation. *Anthropologica et Praehistorica*, *117*, 135–162.

J J O'Connor and E F Robertson. (2000). The teaching of mathematics in Ancient Greece. *Article*.

Kaku, A. M., & Arthur, Y. D. (2025). Mediating role of student interest on the relationship between student mathematics perception and performance. *Journal of Pedagogical Sociology and Psychology*, *7(1)*, 81–94. https://doi.org/doi.org/10.33902/jpsp.202529832

Kim, J., Kim, D. H., & Kwak, S. G. (2024). Comprehensive guidelines for appropriate statistical analysis methods in research. *Korean Journal of Anesthesiology*, *77*(5), 503–517.

Kimberlin, C. L., & Winterstein, A. G. (2008). Validity and reliability of measurement instruments used in research. *American Journal of Health-System Pharmacy*, *65*(23), 2276–2284.

Kisakye, F. (2025, February). Highs and lows in new O'level curriculum. *Observer*.

Kivunja, A. C., Ahmed, A., & Kuyini, B. (2017). Understanding and Applying Research Paradigms in Educational Contexts. *International Journal of Higher Education*, *6*(5), 26–41. https://doi.org/10.5430/ijhe.v6n5p26

Lin, W., Yin, H., Han, J., & Han, J. (2020). Teacher–student interaction and Chinese students' mathematics learning outcomes: The mediation of mathematics achievement emotions. *International Journal of Environmental Research and Public Health*, *17*(13), 4742.

Liu, Y., Wang, Y., Liu, R. De, Ding, Y., Wang, J., & Mu, X. (2022). How Classroom Environment Influences Academic Enjoyment in Mathematics Among Chinese Middle School Students: Moderated Mediation Effect of Academic Self-Concept and Academic Achievement. *Psychology Research and Behavior Management*, *15*(July), 2035–2048. https://doi.org/10.2147/PRBM.S371092

Luo, Z., Dang, Y., & Xu, W. (2019a). Academic Interest Scale for Adolescents : Development , Validation , and Measurement Invariance With Chinese Students. *Frontiers in Psychology*, *10*(October), 1–14. https://doi.org/10.3389/fpsyg.2019.02301

Luo, Z., Dang, Y., & Xu, W. (2019b). Academic Interest Scale for Adolescents: Development, Validation, and Measurement Invariance With Chinese Students. *Frontiers in Psychology*, *10*(October), 1–14. https://doi.org/10.3389/fpsyg.2019.02301

Ma, Y., & Wei, C. (2022). *The relationship between perceived classroom climate and academic performance among English-major teacher education students in Guangxi , China : The mediating role of student engagement*. *August*, 1–13. https://doi.org/10.3389/fpsyg.2022.939661

Maciejewski, M. L. (2020). Quasi-experimental design. *Biostatistics & Epidemiology*, *4*(1), 38–47.

Manyiraho, D., Atibuni, D. Z., Olema, D. K., & Wamakote, L. (2020). SESEMAT In-service Pedagogical Strategies and Students ' Achievement in Science at Ordinary Level in Tororo SESEMAT Region. *American Journal of Educational Research*, *8*(5), 309–320. https://doi.org/10.12691/education-8-5-14

Miller, C. J., Smith, S. N., & Pugatch, M. (2020). Experimental and quasi-experimental designs in implementation research. *Psychiatry Research*, *283*, 112452.

Mullis, I. V. S., & Kelly, D. L. (2022). International Achievement in Mathematics, Science, and Reading. *International Handbook of Comparative Large-Scale Studies in Education*, 1243.

Naigaga, P. (2019). *School facilities maintenance and students' academic achievement in government aided secondary schools in Hoima district, Uganda*. Kyambogo University.

Niyazova, G. B., Utemov, V. V, Savina, T. N., Karavanova, L. Z., Karnaukh, I. S., Zakharova, V. L., & Galimova, E. G. (2022). Classification of open mathematical problems and their role in academic achievement and motivation of students. *Eurasia Journal of Mathematics, Science and Technology Education*, *18*(8), em2143.

Nwokedi, B. F. C. (2023). Influence of classroom environment on the academic performance of students in English language. *International Journal of Advance Social Sciences and Education (IJASSE)*, *1*(4), 191–198.

Ogbuanya, T. C., Attahiru, A., Momngu Tiough, D., & Olubunmi Obe, M. (2017). Influence of Psychosocial Environment on Students' Achievement in Basic Electricity in Government Technical Colleges in Niger State, Nigeria. *Global Journal of Pure and Applied Mathematics*, *13*(8), 4199–4221. http://www.ripublication.com

Oribhabor, C. B. (2020). Evaluating the effect of activity based method of teaching mathematics on Nigerian secondary school students achievement in mathematics. *ArXiv Preprint ArXiv:2011.10785*.

Peşman, H., Güler, T., Arı, Ü., & Erdoğan, F. (2024). Constructivist Learning Environment: A Perfect Mediator for The Relationship of Students' Multiple Intelligences with Attitudes Towards and Achievement in STEM. *Bartın University Journal of Faculty of Education*, *13*(4), 1045–1061.

Phan, H. P., & Ngu, B. H. (2018). An examination of social and psychological influences on academic learning: A focus on self-esteem, social relationships, and personal interest. Social Psychology of Education,. *Social Psychology of Educat*, *21*, 51-73. https://doi.org/.org/10.1007/s11218-017-9407-9

Popper, K. (2005). *The logic of scientific discovery*. Routledge.

Qureshi, A. M., Fatima, Q., Kanwal, A., & Abiodullah, M. (2021). A Students' Perspective on Classroom Learning Environment in Secondary Schools of Pakistan. *Ilkogretim Online*, *20*(5).

Rajab Mukombozi and Felix Ainebyoona. (2023, June). Why dividing Why dividing Mbarara has crippled services. *Monitor - Uganda*.

Ren, X., Jing, B., Li, H., & Wu, C. (2022). The impact of perceived teacher support on Chinese junior high school students' academic self-efficacy: The mediating roles of achievement goals and academic emotions. *Frontiers in Psychology*, *13*, 1028722. https://doi.org/al. 10.3389/fpsyg.2022.1028722

Rogers, J., & Revesz, A. (2019). Experimental and quasi-experimental designs. In *The Routledge handbook of research methods in applied linguistics* (pp. 133–143). Routledge.

Ryan, R. M., & Deci, E. L. (2000a). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68.

Ryan, R. M., & Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Sainio, P. (2021). The role of learning difficulties in adolescents' academic emotions and achievement across the transition from primary school to lower secondary school. *JYU Dissertations*.

Shao, Y., Kang, S., Lu, Q., Zhang, C., & Li, R. (2024). How peer relationships affect academic achievement among junior high school students: The chain mediating roles of learning motivation and learning engagement. *BMC Psychology*, *12*(1), 278.

Shernoff, D. J. (2016). The influence of the high school classroom environment on learning as mediated by student engagement. *School Psychology International*, *October*. https://doi.org/10.1177/0143034316666413

Siega, B., Caño, R. N. D., Namuro, B. R., Caiga, E. V, & Vidal, C. C. (2020). Effects of Classroom Environment on the Academic Achievement of Secondary High School Students. *Bulletin of Education and Research*, *40*(2), 207–218.

Skordi, P., & Fraser, B. J. (2018). Validity and use of the What Is Happening In this Class ? (WIHIC) questionnaire in university business statistics classrooms. *Learning Environments Research*, *0123456789*. https://doi.org/10.1007/s10984-018-09277-4

Tosto, M. G., Asbury, K., Mazzocco, M. M. M., Petrill, S. A., & Kovas, Y. (2016a). From classroom environment to mathematics achievement : The mediating role of self-perceived ability and subject interest. *Learning and Individual Differences*. https://doi.org/10.1016/j.lindif.2016.07.009

Tosto, M. G., Asbury, K., Mazzocco, M. M. M., Petrill, S. A., & Kovas, Y. (2016b). From classroom environment to mathematics achievement: The mediating role of self-perceived ability and subject interest. *Learning and Individual Differences*, *50*, 260–269. https://doi.org/10.1016/j.lindif.2016.07.009

Uganda National Examination Board. (2026). Statement of the release of results of the 2025 Uganda Certificate of education (UCE) Examination. *Report UNEB/ED/RS/UCE/2025*.

Usán Supervía, P., Salavera Bordás, C., & Lorente, V. M. (2020). The mediating role of goal orientation (Task) in the relationship between engagement and academic self-concept in students. *International Journal of Environmental Research and Public Health*, *17*(22), 8323.

Van Eeuwijk, P., & Angehrn, Z. (2017). *How to… conduct a focus group discussion (FGD). Methodological Manual*.

Wang, W., Han, L., Lu, Q., Lv, X., Liu, Y., & Wang, D. (2024). Research on the impact of the socio-educational environment on the academic performance of college students: the mediating role of study motivation. *Frontiers in Psychology*, *14*, 1289064.

Wu, H., Zheng, J., Li, S., & Guo, J. (2019). Does academic interest play a more important role in medical sciences than in other disciplines? A nationwide cross-sectional study in China. *BMC Medical Education*, *19*(1), 1–8. https://doi.org/10.1186/s12909-019-1737-1

Yang, Y., Li, G., Su, Z., & Yuan, Y. (2021). Teacher's Emotional Support and Math Performance: The Chain Mediating Effect of Academic Self-Efficacy and Math Behavioral Engagement. *Frontiers in Psychology*, *12*, 651608. https://doi.org/|.org/10.3389/fpsyg.2021.651608

Yin, H., Shi, L., Tam, W. W. Y., & Lu, G. (2020). Linking university mathematics classroom environments to student achievement: The mediation of mathematics beliefs. *Studies in Educational Evaluation*, *66*, 100905.

Yu, J., Huang, C., Han, Z., He, T., & Li, M. (2020). Investigating the influence of interaction on learning persistence in online settings: Moderation or mediation of academic emotions? *International Journal of Environmental Research and Public Health*, *17*(7), 2320.

Zhai, X., & Pellegrino, J. W. (2023). Large-scale assessment in science education. In *Handbook of research on science education* (pp. 1045–1097). Routledge.

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