



The Influence of Classroom Physical Conditions on Pupils' Academic Performance in Public Primary Schools in Butiama District, Mara Region, Tanzania

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Abstract: This study examined the influence of classroom physical conditions on pupils' academic performance in public primary schools in Butiama District, Mara Region, Tanzania. The study was guided by Bronfenbrenner's Ecological Systems Theory (1979) and adopted a pragmatic paradigm with a mixed-methods approach using an exploratory sequential research design. Data were collected from 203 respondents comprising 167 teachers, 18 head teachers, and 18 Ward Education Officers from 18 purposively selected public primary schools. Questionnaires were administered to teachers, while semi-structured interviews were conducted with head teachers and Ward Education Officers. Quantitative data were analysed using frequencies, percentages, means, and standard deviations, while qualitative data were analysed thematically. The findings showed that classroom physical conditions were generally inadequate, with mean scores of 2.40 for classroom infrastructure adequacy, 2.33 for availability of learning facilities, 2.26 for learning environment conditions, and 2.18 for teaching and learning resources. Qualitative findings further revealed that classroom shortages and overcrowding, inadequate desks, poor ventilation and lighting, and shortages of teaching and learning resources reduced pupils' concentration, participation, comfort, teacher-pupil interaction, and understanding of lessons, thereby negatively affecting academic performance. The study concludes that conducive classroom physical conditions are important for supporting pupils' academic performance. It recommends that the Ministry of Education, Science and Technology and Local Government Authorities strengthen investment in adequate classrooms, desks, lighting, ventilation, learning facilities, and regular maintenance, particularly in overcrowded and disadvantaged schools.

Keywords: Classroom physical conditions, academic performance, pupils, public primary schools, learning environment.

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1. Introduction

Pupils' academic performance in primary schools is crucial as it lays the foundation for future learning, individual development, and long-term socio-economic progress. Strong academic performance at this stage improves literacy, numeracy, and cognitive skills, which are vital for progression to higher levels of education and for lifelong learning (UNESCO, 2015). It also

increases self-esteem, reduces dropout rates, and prepares children to become productive citizens (McClelland et al., 2015). Despite this importance, poor academic performance among pupils continues to be a persistent challenge globally.

Globally, concerns about pupils' learning outcomes have increased, particularly following disruptions to education and persistent inequalities in access to quality learning environments. Evidence from different

education systems indicates that the conditions in which pupils learn can affect their engagement and educational achievement. For example, the United States recorded continuing concerns about foundational learning, with the 2022 National Assessment of Educational Progress (NAEP) showing that only 33% of Grade Four pupils achieved proficiency in reading (NCES, 2022). Similarly, OECD (2023) reported declining foundational competencies among learners in Canada, while in the United Kingdom, only 60% of Year Six pupils met the expected standards in reading, writing, and mathematics in 2023 (DfE, 2023). Although these outcomes are influenced by multiple factors, inadequate physical learning environments, including overcrowding, poor ventilation, insufficient lighting, and inappropriate classroom furniture, can limit pupils' ability to concentrate and participate effectively. This demonstrates the importance of examining classroom physical conditions as part of efforts to improve pupils' academic performance.

The challenge is also evident in many African countries, where inadequate school infrastructure and unfavourable classroom conditions continue to affect the quality of primary education. In Ghana, a 2023 UNICEF study found that 62% of Primary Four pupils performed below basic proficiency in mathematics and 50% in English. In Uganda, only 51.5% of Primary Six pupils in public schools achieved proficiency in numeracy, while 35.9% achieved proficiency in literacy (UNEB, 2023). Such learning challenges occur alongside problems related to overcrowded classrooms, inadequate furniture, poor sanitation, insufficient lighting, and limited ventilation in some public schools. In Tanzania, Twaweza (2023) reported that 61% of children aged 6–8 could not read and understand a Standard Two-level Kiswahili story, while 74% struggled with basic arithmetic. Malingumu (2023) associated poor learning outcomes with inadequate school infrastructure and learning resources, while Mwakabungila (2024) reported that overcrowded classrooms and irregular funding negatively affected instructional quality and learner engagement. These findings suggest that improving the physical classroom environment may be an important strategy for creating conditions that support pupils' concentration, participation, and academic achievement.

The situation requires particular attention in Butiama District, Mara Region, where pupils have continued to experience challenges in achieving satisfactory academic outcomes. The 2023 Primary School Leaving Examination (PSLE) results indicated that Butiama District recorded a pass rate of 72%, compared with higher averages reported at national and regional levels (NECTA, 2023). While pupils' academic performance may be influenced by several factors, the physical conditions of classrooms are an important area requiring empirical investigation. Issues such as inadequate classroom space, overcrowding, poor ventilation and lighting, insufficient desks, classroom cleanliness, and

uncomfortable learning conditions may affect pupils' concentration, attendance, participation, and ultimately their academic performance. Although previous studies have examined broader school infrastructure, teacher capacity, learning resources, and school climate (Malingumu, 2023; Ngwira, 2022; Kipng'etich et al., 2023), limited attention has been given specifically to how classroom physical conditions influence pupils' academic performance in public primary schools in Butiama District. Therefore, this study seeks to examine the influence of classroom physical conditions on pupils' academic performance in public primary schools in Butiama District, Tanzania.

2. Literature Review

2.1 Theoretical Review

This study is guided by Bronfenbrenner's Ecological Systems Theory (1979), which explains that pupils' learning and development are influenced by different environmental systems. The study focuses on the microsystem, particularly the physical classroom conditions such as classroom space, ventilation, lighting, furniture, cleanliness, and overcrowding, which directly influence pupils' concentration, participation, and academic performance. The theory is useful because it links pupils' learning outcomes with their immediate learning environment, although its broad nature may limit its ability to explain specific classroom factors in detail. In this study, the theory therefore provides a framework for examining how classroom physical conditions influence pupils' academic performance in public primary schools in Butiama District.

2.2 Empirical Studies

Mohammad et al. (2024) examined how the school environment affects teachers' commitment to educational quality in Malaysia. The study adopted a quantitative approach, where data were collected using questionnaires and analysed using IBM-SPSS version 25 and Smart PLS. A total of 258 teachers participated in the study. The findings indicated that a comfortable, safe, and well-maintained school environment enhanced learning effectiveness, while a poor physical environment negatively affected educational quality and learner outcomes. Although the study benefited from a relatively large sample that supported strong statistical analysis, it gave limited insight into the individual's lived experiences within schools. The current study addressed this gap by focusing on a smaller, localised sample in Butiama District to explore how the internal school environment influences pupils' academic performance.

Owoseni et al. (2020) investigated the effect of the physical learning environment on pupils' learning outcomes in Nigeria. The study employed a quantitative research design and collected data from 674 participants

across three senatorial districts. Data were analysed using descriptive statistics with SPSS. The findings revealed that safe, clean, and well-equipped schools promoted better learning conditions, increased attendance, and improved academic performance. However, the study relied solely on quantitative data, which limited its ability to capture contextual factors such as teacher–pupil interaction and the emotional climate of schools. The current study addressed this limitation by adopting a mixed-methods approach to provide a more comprehensive understanding of how the internal school environments influences the academic performance in Butiama District.

Suleiman and Otieno (2022) explored how the school learning environment influences education quality in Arusha, Tanzania. The study adopted a mixed-methods approach under a convergent parallel design, where data were collected using questionnaires and semi-structured interviews from 97 respondents. Quantitative data were analysed using descriptive statistics with SPSS version 20, while qualitative data were analysed through content analysis. The findings showed that adequate school facilities and sufficient teaching staff contributed to a conducive learning environment and improved education quality. However, the study focused broadly on education quality rather than specifically on pupils’ academic performance. The current study addressed this gap by examining how the internal school environment directly influenced pupils’ academic performance in primary schools in Butiama District.

3. Methodology

The study adopted a mixed-methods approach guided by the pragmatic paradigm and used an exploratory sequential design. It was conducted in Butiama District, Mara Region, Tanzania, and involved teachers, head teachers, and Ward Education Officers (WEOs). The study selected 203 participants from 18 public primary schools: 167 teachers, 18 head teachers, and 18 WEOs. The 18 schools were purposively selected based on consistently low pupils’ academic performance; teachers were selected through simple random sampling, while head teachers and WEOs were purposively selected based on their leadership and supervisory roles. Data were collected using structured

questionnaires for teachers and semi-structured interviews for head teachers and WEOs. Questionnaires were administered in person, while interviews were conducted with participants’ consent, audio-recorded, and transcribed. Pilot testing, expert review, triangulation, member checking, and inter-coder agreement were used to enhance the reliability, validity, and trustworthiness of the data.

Quantitative data were coded and analysed using SPSS version 25 through frequencies, percentages, means, standard deviations, correlation, and regression analysis, while qualitative data were transcribed verbatim and analysed thematically using NVivo, involving coding, categorisation, and identification of patterns and themes. Quantitative and qualitative findings were triangulated to provide a comprehensive understanding of the study problem. Ethical considerations included obtaining research permits and ethical clearance from relevant authorities, including the District Executive Director, District Education Officer, and the Open University of Tanzania. Participation was voluntary, and informed consent was obtained after explaining the study purpose, procedures, participants’ rights, and freedom to withdraw without penalty. Confidentiality and privacy were maintained by using identification codes instead of names, securely storing data in password-protected files, restricting access to the researcher, and using the information strictly for academic purposes.

4. Results and Discussion

This section presents the findings and discussion on how physical classroom conditions influence pupils’ academic performance in public primary schools in Butiama District. The analysis was guided by the research question: How do physical classroom conditions influence pupils’ academic performance in public primary schools in Butiama District? The findings are based on responses from 167 teachers, complemented by qualitative information from Head Teachers and Ward Education Officers (WEOs). The mean (M) and standard deviation (SD) were used to determine the level and variation of responses across dimensions.

Table 1: Influence of Physical Classroom Conditions on Pupils’ Academic Performance (n = 167)

Dimension	Mean (M)	Std. Deviation (SD)
Classroom infrastructure adequacy	2.40	1.11
Availability of learning facilities	2.33	1.09
Learning environment conditions	2.26	1.14
Availability of teaching and learning resources	2.18	1.10

Source: Field Data (2026)

The results presented in Table 1 indicate that respondents generally disagreed that physical classroom

conditions were adequate to support pupils’ academic performance in public primary schools in Butiama

District, as all mean scores fall below 3.00. Overall, the findings suggest that the learning environment was characterised by inadequacies in key areas such as infrastructure and teaching and learning resources. This implies that deficiencies in classroom facilities and learning materials remained a major challenge, which was likely to negatively affect pupils' academic performance.

4.1 Classroom Infrastructure Adequacy

The findings in Table 1 show that the mean score for classroom infrastructure adequacy is 2.40 with a standard deviation of 1.11. These results indicate that respondents generally disagreed that classroom infrastructure, such as adequate classrooms and learning space, was sufficient to support effective teaching and learning in public primary schools. The responses also show moderate variation among teachers, suggesting that perceptions differed slightly across schools in Butiama District.

Interview data from Head Teachers and Ward Education Officers (WEOs) provided further information on classroom infrastructure and its influence on pupils' academic performance. In this regard, one Head Teacher stated:

In many of our schools, the number of classrooms is not enough compared to the number of pupils enrolled. This situation forces teachers to handle overcrowded classrooms where pupils sit in very limited space, making it difficult to control learners and deliver lessons effectively, especially during group work activities and assessments. (Interview with the Head Teacher A, 2026).

On the same matter, another Head Teacher reported:

The shortage of classrooms is a serious challenge. In some cases, one classroom is shared by many pupils beyond the recommended number, which reduces interaction between teachers and pupils and negatively affects pupils' understanding and performance in their academic work. (Interview with the Head Teacher B, 2026).

The Ward Education Officer added:

Overcrowded classrooms remain a major problem in several schools. Teachers struggle to manage large classes, and this affects lesson delivery, individual attention to pupils, and overall academic performance in primary schools. This situation reduces effective classroom interaction and limits teachers' ability to support slow learners adequately, thereby negatively influencing pupils' academic achievement. (Interview with the WEO A, 2026).

The findings therefore indicate that inadequate classroom infrastructure was significantly undermining effective teaching and learning processes in public primary schools in Butiama District. The shortage of classrooms and resulting overcrowding was limiting teacher–pupil interaction, reducing classroom control, and ultimately contributing to poor pupils' academic performance.

These findings align with Bronfenbrenner's Ecological Systems Theory, which emphasises that the immediate learning environment (microsystem) plays a critical role in shaping a child's cognitive and academic development. When classroom infrastructure is poor, the quality of interaction between teachers and learners is reduced, and opportunities for active engagement in learning become limited. The findings also correspond with UNESCO (2023), which reports that inadequate classroom infrastructure in many developing countries significantly affects teaching effectiveness and learner achievement. Similarly, World Bank (2022) notes that overcrowded and poorly structured classrooms reduce instructional quality, learner participation, and overall academic performance.

4.2 Availability of Learning Facilities (Desks, Chairs, Seating Arrangements)

Table 1 results show that the mean score for the availability of learning facilities is 2.33 with a standard deviation of 1.09. These results indicate that the respondents generally disagreed that desks, chairs, and seating arrangements were adequately available to support effective teaching and learning in public primary schools. The responses also show moderate variation among teachers, suggesting differences in the availability of learning facilities across schools.

Interview data from Head Teachers and Ward Education Officers (WEOs) provided further information on the availability of the learning facilities and their influence on pupils' academic performance. On this issue, one Head Teacher stated:

In most of our classrooms, pupils are forced to share desks because the number of desks available is not enough for all learners enrolled. In some cases, three or even four pupils share one desk, and this situation makes writing difficult, reduces comfort, and affects pupils' ability to concentrate during lessons. (Interview with the Head Teacher C, 2026).

Concerning the same matter, another Head Teacher reported:

The shortage of desks and chairs is a very serious challenge in many schools. Due to this, some pupils are forced to sit on the floor or stand during lessons, which makes them uncomfortable and less motivated to participate actively in classroom activities and

affects their academic progress. (Interview with the Head Teacher D, 2026).

The Ward Education Officer added:

Many schools still experience a shortage of desks and proper seating facilities. Pupils sit in poor conditions, and this creates discomfort in classrooms, reduces attention span, and negatively affects their academic performance in both classroom tasks and assessments. (Interview with The Ward Education Officer B, 2026).

The findings therefore indicate that the shortage of desks, chairs, and appropriate seating arrangements significantly affects the learning environment in public primary schools. Poor seating conditions reduce pupils' comfort, limit participation in classroom activities, and interfere with concentration during lessons. As a result, the overall teaching and learning process becomes less effective, leading to lower academic performance among pupils.

These findings are consistent with Bronfenbrenner's Ecological Systems Theory, which argues that learners' development is strongly influenced by the quality of their immediate environment, including access to necessary learning resources. When resources are limited, pupils are unable to fully engage with learning tasks, which affects their academic progress. The findings also align with UNICEF (2023) which highlights that shortages of learning materials and basic facilities significantly reduce learning effectiveness in primary schools. Similarly, Adeyemi (2021) found that inadequate classroom resources was negatively affecting student motivation, participation, and academic achievement, particularly in resource-constrained school settings.

4.3 Learning Environment Conditions (Ventilation, Lighting, Classroom Comfort)

The findings in Table 1 show that the mean score for learning environment conditions is 2.26 with a standard deviation of 1.14. These results indicate that the respondents generally disagreed that classroom ventilation, lighting, and overall comfort were adequate to support effective teaching and learning. The responses also show variation among teachers, suggesting that learning environment conditions differed across schools.

Interview data from Head Teachers and Ward Education Officers (WEOs) gave further insights on learning environment conditions and their influence on pupils' academic performance. In this regard, one Head Teacher stated:

In many classrooms, ventilation is very poor because windows are either too small or

broken, and this makes classrooms very hot, especially during midday lessons. As a result, pupils become tired quickly, lose concentration, and fail to actively participate in learning activities throughout the lesson period. (Interview with the Head Teacher E, 2026).

Another Head Teacher reported:

Lighting is also a serious challenge in some classrooms, especially those with damaged windows or poorly constructed buildings. In these classrooms, teachers sometimes struggle to write clearly on the board, and pupils sitting at the back find it difficult to see what is being taught, which affects understanding. (Interview with Head Teacher F, 2026).

The Ward Education Officer added:

The general classroom environment in several schools is not conducive to learning. Poor ventilation, inadequate lighting, and uncomfortable classroom conditions reduce pupils' focus and make teaching more difficult, which ultimately affects their academic performance and learning outcomes. (Interview with the WEO C, 2026).

The findings therefore indicate that poor learning environment conditions negatively affect the teaching and learning process in public primary schools. Unfavourable ventilation, inadequate lighting, and uncomfortable classroom conditions reduce pupils' concentration, lower participation in lessons, and create fatigue during learning activities. This ultimately contributes to poor academic performance among pupils.

These findings align with Bronfenbrenner's Ecological Systems Theory, which emphasises that environmental conditions within the microsystem directly influence learners' emotional stability, motivation, and cognitive development. A poor learning environment reduces pupils' ability to focus and engage meaningfully in classroom activities. The findings also correspond with the World Bank (2022), which reports that poor school environments negatively affect student achievement and classroom engagement. Similarly, Komba and John (2020) found that unfavourable school environments in Tanzania contribute significantly to low academic performance among primary school pupils.

4.4 Availability of Teaching and Learning Resources

The results in Table 1 show that the mean score for availability of teaching and learning resources is 2.18 with a standard deviation of 1.10. These results indicate that respondents generally disagreed that teaching and learning resources such as textbooks, charts, and

instructional materials were sufficiently available to support effective teaching. The responses also show variation among teachers, suggesting differences in resource availability across schools.

Interview data from Head Teachers and Ward Education Officers (WEOs) provided further information on teaching and learning resources and their influence on pupils' academic performance. On this issue, one Head Teacher stated:

In many schools, there is a serious shortage of textbooks and teaching materials. Teachers are often forced to share limited resources among large classes, which limits effective lesson preparation and reduces pupils' opportunities to engage with learning materials during classroom instruction. (Interview with the Head Teacher G, 2026).

On the same discussion, another Head Teacher reported:

Teachers sometimes have to rely only on verbal explanations because there are not enough charts, books, or visual aids. This situation makes lessons less interactive and affects pupils' understanding, especially in subjects that require practical illustrations and demonstrations in classroom learning. (Interview with the Head Teacher H, 2026).

The Ward Education Officer added:

The shortage of teaching and learning materials remains a major challenge in many schools. Without adequate resources, teachers struggle to implement effective teaching strategies, and pupils are left with limited learning support, which affects their academic achievement significantly and consistently."(Interview with the WEO D, 2026).

The findings therefore indicate that inadequate teaching and learning resources significantly affect the quality of instruction in public primary schools. The shortage of textbooks, instructional materials, and visual aids limits teacher effectiveness, reduces classroom interaction, and negatively affects pupils' understanding and academic performance.

The findings align with Bronfenbrenner's Ecological Systems Theory, which emphasises that learning outcomes depend on the availability of supportive environmental inputs that facilitate interaction and knowledge construction. When instructional resources are limited, the teaching process becomes less interactive and less effective. The findings also correspond with UNESCO (2023), which highlights that a lack of teaching and learning materials reduces instructional quality and learner achievement in primary education systems. Similarly, Mwenda and Nyoni

(2021) found that insufficient learning resources were negatively affecting pupils' comprehension, participation, and academic performance.

5. Conclusions and Recommendations

5.1 Conclusion

The study concludes that classroom physical conditions have an important influence on pupils' academic performance in public primary schools. The findings indicate that inadequate classrooms, overcrowding, insufficient desks, inadequate lighting and ventilation, and limited availability of essential learning facilities create unfavourable conditions for learning. Such conditions may limit pupils' concentration, participation, comfort, and interaction during lessons, thereby affecting their understanding and academic achievement.

5.2 Recommendations

Based on the findings, the study recommends that

1. The Ministry of Education, Science and Technology (MoEST) and Local Government Authorities (LGAs) should improve classroom physical conditions by providing adequate classrooms, desks, proper lighting, ventilation, and other essential facilities.
2. School heads and management committees should ensure regular maintenance and timely repair of classroom facilities to provide safe and conducive learning environments.
3. Education stakeholders should also support the construction of additional classrooms in overcrowded schools and mobilise resources to address inequalities in classroom facilities, particularly in disadvantaged schools.
4. Future researchers should examine how specific classroom conditions, such as overcrowding, lighting, ventilation, furniture, and classroom space, influence pupils' academic performance.

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