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Synthesizing Trends in Research on Impact of School Facilities and Students Academic Performances: A PRISMA-Based Systematic Literature Review

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Abstract
School facilities are widely recognized as important determinants of students' learning experiences and academic success. This study synthesized existing research on the relationship between school facilities and students' academic performance using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. The review aimed to identify research trends, summarize empirical evidence, examine methodological approaches, and highlight gaps in the literature. A systematic search of Google Scholar, Scopus, Web of Science, ERIC, and ScienceDirect identified relevant studies published in English between 2014 and 2025. Eligible studies were selected using predefined inclusion and exclusion criteria and analyzed through descriptive and thematic synthesis. The findings consistently indicated that the availability, adequacy, quality, and maintenance of school facilities positively influence students' academic performance. Well-equipped classrooms, libraries, science laboratories, ICT facilities, sanitation facilities, furniture, and recreational spaces were associated with improved learning outcomes, student motivation, attendance, and engagement. The review also revealed that quantitative research designs predominated, while mixed-methods and longitudinal studies were relatively limited. Furthermore, disparities in the provision and quality of school facilities between urban and rural schools, particularly in developing countries, continue to affect educational outcomes. The study concludes that sustained investment in educational infrastructure, equitable distribution of school facilities, effective maintenance practices, and increased support for rigorous future research are essential for enhancing students' academic performance and improving the quality of education.

Keywords: academic performance, educational infrastructure, PRISMA, school facilities, systematic literature review

Introduction
Education is widely recognized as a fundamental instrument for national development and human capital formation. The quality of education provided in schools depends not only on the competence of teachers and the effectiveness of instructional practices but also on the availability and quality of school facilities. School facilities, often referred to as educational infrastructure or school plant, comprise the physical resources that support teaching and learning, including classrooms, libraries, laboratories, workshops, administrative offices, furniture, sanitation facilities, sports grounds, information and communication technology (ICT) facilities, and other learning spaces. These facilities create an enabling environment that promotes effective instruction, enhances students' motivation, and supports improved academic achievement (Earthman, 2014; Uline & Tschannen-Moran, 2018). Over the past two decades, growing attention has been given to understanding how school facilities influence students' academic performance. Researchers have consistently reported that students who learn in schools with adequate, safe, and well-maintained facilities tend to perform better academically than those in poorly equipped learning environments (Barrett et al., 2015; Schneider, 2012). However, despite the increasing volume of research on school facilities and academic performance, findings across studies have not always been consistent. While many studies report significant positive relationships between educational infrastructure and students' achievement, others suggest that school facilities alone cannot guarantee improved academic performance without complementary factors such as teacher quality, effective school leadership, adequate funding, parental involvement, and students' socioeconomic background (Hanushek, 2023). These differences may arise from variations in research design, geographical location, educational context, sample characteristics, and the indicators used to measure both school facilities and academic performance.

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The growing diversity of findings underscores the need for systematic evidence synthesis. Unlike traditional narrative reviews, systematic literature reviews apply transparent and replicable procedures to identify, screen, evaluate, and synthesize available evidence while minimizing researcher bias (Page et al., 2021). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) provides internationally recognized guidelines that improve the transparency, consistency, and quality of systematic reviews. Through a structured process of study identification, screening, eligibility assessment, and inclusion, the PRISMA framework enables researchers to generate comprehensive and reliable summaries of existing knowledge. Therefore, this study addresses this gap by conducting a PRISMA-based systematic literature review on the impact of school facilities on students' academic performance. Specifically, the review synthesizes existing empirical evidence, identifies major research trends, examines methodological characteristics of previous studies, and highlights gaps that can guide future research and educational policy. The findings are expected to contribute to the literature on educational management and provide evidence-based recommendations for policymakers, school administrators, educational planners, and other stakeholders seeking to improve learning outcomes through effective provision and management of school facilities.

Methodology

This study adopted a systematic literature review (SLR) design guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework. A systematic literature review is a rigorous and transparent research method used to identify, evaluate, and synthesize available empirical evidence relating to a specific research question while minimizing bias (Page et al., 2021). The PRISMA framework was selected because it provides standardized procedures for identifying, screening, assessing eligibility, and including relevant studies, thereby enhancing the transparency, reliability, and reproducibility of systematic reviews.

Review Protocol

The review followed the four major stages recommended by the PRISMA 2020 Statement: identification, screening, eligibility, and inclusion (Page et al., 2021). A review protocol was developed before the literature search to define the review objectives, search strategy, eligibility criteria, data extraction process, and synthesis procedures. Establishing the protocol prior to data collection reduced the likelihood of selection bias and ensured consistency throughout the review process.

Research Questions

1. What evidence exists in the literature regarding the effectiveness of school facilities on enhancing students' academic performance in Secondary Schools?
2. How does school facilities influence students' academic performance in Secondary Schools, as reported in the reviewed literature?
3. What patterns emerge in literature on the use of research designs and geographical locations (foreign or local) in studies investigating the impact of school facilities on students' academic performance in Secondary Schools?

Search Strategy

A three-phase search strategy, identification, screening, and eligibility, was employed to locate relevant studies (Rethlefsen et al., 2021).

i.Identification Phase

A comprehensive literature search was conducted using five major electronic databases: Google Scholar, Scopus, Web of Science, ERIC (Education Resources Information Center), and ScienceDirect. These databases were selected because they provide extensive coverage of peer-reviewed educational research to identify peer-reviewed empirical studies published between 2014 and 2025. The search combined keywords using Boolean operators (AND, OR). The principal search terms included: "school facilities" OR "school infrastructure" OR "educational facilities" OR "school plant" AND "students' academic performance" OR "academic achievement" OR "learning outcomes" AND "secondary schools" OR "schools" AND "educational infrastructure". Additional manual searches of the reference lists of eligible studies were conducted to identify relevant articles that were not retrieved through the electronic database searches. The initial search yielded 414 records.

ii.Screening Phase

Duplicate records (170) were removed, leaving 244 articles for title and abstract screening. Studies unrelated to school facilities on students' academic performance in secondary schools were excluded, reducing the pool to 40 full-text articles.

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iii. Eligibility

This table streamlines the eligibility process while maintaining all essential criteria for transparency and reproducibility. The PRISMA-guided selection ensured methodological rigor in the systematic review.

Table 1: Eligibility Criteria for selection of the articles

Category	Inclusion Criteria	Exclusion Criteria
Population	Addressing school facilities in primary or secondary education	Focused solely on higher education or early childhood education
Intervention	Examined the relationship between school facilities and students' academic performance	Studies not focused on relationship between school facilities and students' academic performance
Outcomes	Measured at least one: School facilities, physical facilities, instructional facilities, school infrastructures, or academic performance	No empirical assessment of these outcomes
Study Design	Employed quantitative, qualitative, or mixed-methods research designs	Theoretical studies, opinion pieces, or non-empirical reviews
Publication	Were published between 2014 and 2025	Dissertations, non-peer-reviewed articles, or studies outside the date range
Geographical Scope	North-west geo-political zone, Nigeria	Studies outside North-west geo-political zone, Nigeria

Study Selection Process

The study selection process followed the PRISMA 2020 flow procedure. All records identified from the electronic databases were exported into a reference management system, where duplicate records were removed. The titles and abstracts of the remaining articles were screened against the inclusion criteria. Full-text copies of potentially eligible studies were then retrieved and assessed independently for eligibility. Only studies that satisfied all inclusion criteria were retained for the final review. The selection process followed the PRISMA flow diagram by Page et al. (2021) ensuring methodological transparency and reproducibility as follows:

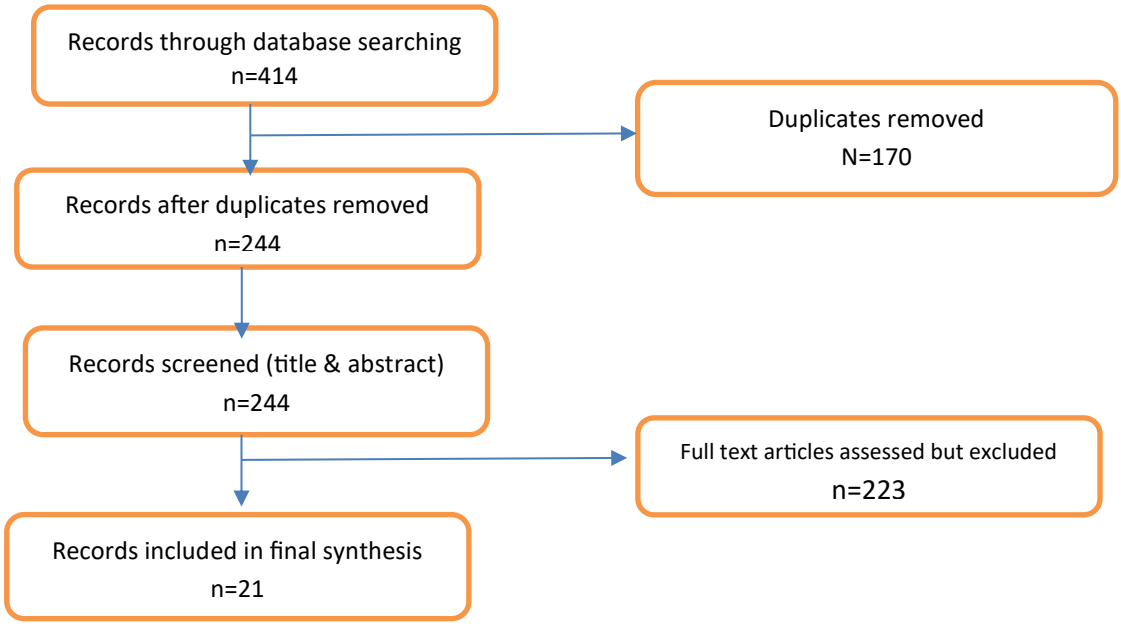

Figure 1: Textual Representation of the PRISMA Flow Diagram

Data Extraction and Analysis

Relevant information was extracted from each included study using a standardized data extraction form. The extracted variables included: author(s) and year of publication, country or study location, research objectives, research design, sample size, educational level, types of school facilities investigated, measures of academic performance, major findings and recommendations. Using a standardized extraction template ensured consistency and improved the reliability of the synthesis.

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Data Synthesis

The extracted data were synthesized using descriptive and thematic synthesis. Descriptive synthesis summarized publication trends, geographical distribution, research designs, sample characteristics, and types of school facilities examined. Thematic synthesis was employed to identify recurring themes and patterns regarding the influence of school facilities on students' academic performance. Similar findings across studies were grouped into common themes, while inconsistencies were identified and discussed. This approach enabled the review to present a comprehensive understanding of existing evidence and highlight areas requiring further investigation (Thomas & Harden, 2018). The summary report of the 21 selected articles is presented in Table 2. The findings of the review are presented following the sequences, such as the name of the authors, publication years, titles, research design, country/location and reported effect on students' academic performance.

Table 2: Data Extraction and Analysis

S/N	Authors & Year	Types of school examined	Research design	Country/Location	Effect on students' academic performance
1	Osuji (2016)	Instructional materials, welfare facilities and health facilities	Descriptive survey research design (questionnaire)	Public Secondary Schools in Giwa and Zaria Education Zones, Kaduna State, Nigeria	Strong positive impact on academic Performance
2	James Attah (2016)	Infrastructure facilities, water and sanitation facilities	Qualitative and quantitative methods (observation and questionnaire)	Public Secondary Schools in Northern, Nigeria	Strong positive impact on academic Performance
3	Ugwulashi (2017)	School safety	Descriptive survey research design (questionnaire)	Public Secondary Schools in River State, Nigeria	Strong positive impact on academic Performance
4	Musa B, (2016)	Instructional facilities, infrastructure facilities and school environment	Qualitative and quantitative methods (observation, interview and questionnaire)	Public Secondary Schools in Nigeria	Strong positive impact on academic Performance
5	Adesua and Akomolafe (2016)	Physical facilities	Ex-post facto design (questionnaire and an inventory)	Public Senior Secondary Schools in South-west, Nigeria	Significant improvement in Performance
6	Ngozi and Halima (2015)	laboratory facilities	Descriptive survey research design (questionnaire)	Public Senior Secondary Schools in Zaria metropolis of Kaduna state, Nigeria	Significant improvement in Performance
7	Takwate (2018)	School facilities	Correlational research design	Public Senior Secondary Schools in Adamawa state, Nigeria	Strong positive impact on academic Performance
8	Otchere, Afari and Kudawe (2019)	School facilities and learning environment	Qualitative and quantitative methods (observation, interview and questionnaire)	Oda Senior High School, Birim Central Municipality, Eastern Region, Ghana	Strong positive impact on academic Performance

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9	Ikegbusi, Manafa and Iheanacho (2022)	Library facilities, ICT equipment's and laboratory facilities	Descriptive survey research design (questionnaire)	Public Secondary School in Lagos State, Nigeria	Strong positive impact on academic Performance
10	Auta, (2017)	Classrooms facilities, laboratory facilities, electricity and pipe-borne water	Descriptive survey research design (questionnaire)	Nigerian air force secondary school	Strong positive impact on academic Performance
11	Sidi (2019)	Infrastructure facilities and instructional facilities	Descriptive survey research design (questionnaire)	Public Senior Secondary Schools North-west zone, Nigeria	Significant improvement in Performance
12	Nkechi (2018)	School facilities	Descriptive survey research design (questionnaire)	Public Senior Secondary Schools, Nigeria	Significant improvement in Performance
13	Olugbenga (2019)	Physical facilities	Descriptive survey research design (questionnaire)	Public Senior Secondary Schools Kaduna state, Nigeria	Significant improvement in Performance
14	Abdul-lateef (2022)	Library and laboratory facilities	Descriptive survey research design (questionnaire)	Oshod-isola Local Government Area senior secondary schools, Lagos State, Nigeria	Strong positive impact on academic Performance
15	Panda (2024)	Sport Facilities	Descriptive survey research design (questionnaire) and Comparative analysis	Nigeria	Strong positive impact on academic Performance
16	Ofojebe (2021)	Health facilities	Descriptive survey research design (questionnaire)	Public secondary school in Delta state, Nigeria	Strong positive impact on academic Performance
17	Ibitola Amoke Oladeji (2023)	Health facilities	A descriptive cross-sectional research design	Public secondary school Students in Ibadan Oyo State, Nigeria	Strong positive impact on academic Performance
18	Chukwuji C (2023)	Library facilities	Descriptive survey research design (questionnaire)	Post Primary Schools in Gusau Local Government, Zamfara state, Nigeria	Strong positive impact on academic Performance
19	Tofi, S. (2019)	Library facilities	Descriptive survey research design (questionnaire)	Public secondary schools in Makurdi metropolis, Benue state, Nigeria	Significant improvement in Performance
20	Abdol reza G. (2016)	Furniture facilities	A descriptive cross-sectional research design (questionnaire and interview)	Post Primary Schools in Ahvaz, southwest of the Islamic republic of Iran	Strong positive impact on academic Performance
21	Florence G. (2021)	Furniture and infrastructure facilities	A descriptive cross-sectional research design	Public secondary school in Akwa Ibom state, Nigeria	Strong positive impact on academic Performance

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			(questionnaire and interview)		

Research Question One: What evidence exists in the literature regarding the effectiveness of school facilities on enhancing students' academic performance in Secondary Schools?

The evidence synthesized from the reviewed literature demonstrates a strong and consistent relationship between the quality of school facilities and students' academic performance in secondary schools. Across diverse educational settings, the studies converge on the conclusion that the availability of adequate, functional, and well-maintained school facilities creates an enabling learning environment that supports effective teaching and enhances students' learning outcomes. Although the magnitude of this relationship varies across contexts, the overall pattern suggests that school facilities constitute an important determinant of academic success (Earthman, 2014; Schneider, 2012). A recurring finding across the reviewed studies is that instructional facilities, including classrooms, science laboratories, libraries, ICT facilities, and classroom furniture, positively influence students' academic achievement by improving access to learning resources and supporting the delivery of quality instruction. Schools equipped with modern and adequate instructional facilities consistently report higher student achievement than schools where such facilities are inadequate or poorly maintained. This finding underscores the role of educational infrastructure as a catalyst for effective teaching and meaningful student engagement (Owoeye & Yara, 2021; Schneider, 2012). Furthermore, the synthesis indicates that the physical condition of school facilities significantly influences students' learning behaviours and educational outcomes. Studies consistently associate well-designed classrooms, adequate lighting, proper ventilation, sufficient learning space, sanitation facilities, and safe school environments with improved student motivation, concentration, attendance, classroom participation, and overall academic performance. Conversely, deteriorating infrastructure, overcrowded classrooms, and poorly maintained facilities are linked to reduced instructional effectiveness and lower academic achievement (Earthman, 2014; Maxwell, 2016; Uline & Tschannen-Moran, 2018). However, the reviewed evidence also highlights that school facilities alone do not guarantee improved academic performance. Several studies emphasize that the educational benefits of physical infrastructure are mediated by complementary factors such as teacher quality, instructional practices, school leadership, effective utilization of facilities, regular maintenance, and adequate funding. Consequently, schools with comparable physical resources may experience different academic outcomes depending on how effectively those resources are managed and integrated into the teaching-learning process (Ajayi & Ayodele, 2021; Uline & Tschannen-Moran, 2018). Another important trend emerging from the literature is the interaction between school facilities and school climate. Evidence suggests that quality physical infrastructure contributes to a positive school climate by promoting students' sense of safety, belonging, and well-being, which in turn enhances engagement, attendance, and academic achievement. This finding indicates that school facilities influence student performance both directly through improved learning conditions and indirectly through their contribution to a supportive educational environment (Maxwell, 2016; Uline & Tschannen-Moran, 2018). In addition, the synthesis provides compelling evidence that investment in quality school facilities contributes significantly to improved academic performance in secondary schools. Nevertheless, the literature consistently emphasizes that infrastructure investments should be accompanied by effective management practices, equitable resource allocation, continuous maintenance, qualified teachers, and supportive educational policies to maximize their educational impact. Therefore, improving school facilities should be viewed as one component of a broader strategy for enhancing educational quality and student achievement.

Research Question Two: How do school facilities influence students' academic performance in Secondary Schools, as reported in the reviewed literature?

The reviewed literature shows that school facilities play a significant role in shaping students' academic performance by creating an environment that supports effective teaching and meaningful learning. Across the studies reviewed, there is broad agreement that the quality and adequacy of school facilities influence not only the physical learning environment but also students' motivation, engagement, and overall learning experiences. These factors collectively contribute to improved academic outcomes (Earthman, 2014; Schneider, 2012). Moreover, one of the major ways school facilities influence academic performance is by providing a conducive environment for learning. Studies consistently report that adequate classrooms, proper lighting, good ventilation, sufficient learning space, comfortable furniture, and clean surroundings help students remain attentive, motivated, and actively involved in classroom activities. Such environments also improve school

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attendance and reduce distractions that could hinder learning. In contrast, overcrowded classrooms and poorly maintained facilities often make learning difficult and negatively affect students' academic achievement (Earthman, 2014; Maxwell, 2016). Furthermore, the literature indicates that instructional facilities, including science laboratories, libraries, workshops, and information and communication technology (ICT) resources, enhance students' learning by making instruction more practical, engaging, and resourceful. Well-equipped laboratories allow students to connect theory with practice, while libraries encourage independent study, critical thinking, and the development of strong reading habits. Likewise, ICT facilities provide students with access to digital learning resources, support interactive teaching methods, and increase classroom engagement, all of which contribute to better academic performance (Owoeye & Yara, 2021; Schneider, 2012). Another important finding from the reviewed studies is that school facilities also improve teachers' effectiveness. When teachers have access to adequate instructional materials and a supportive physical environment, they are better positioned to adopt diverse teaching strategies, organize practical lessons, and manage classroom activities effectively. As a result, students gain a better understanding of lessons, which ultimately enhances their academic achievement (Ajayi & Ayodele, 2021; Uline & Tschannen-Moran, 2018). The reviewed literature also suggests that the influence of school facilities extends beyond the availability of physical resources. Quality facilities help create a positive school climate where students feel safe, comfortable, and motivated to learn. Such an environment promotes regular attendance, active participation, and a stronger sense of belonging, all of which indirectly contribute to improved academic performance (Maxwell, 2016; Uline & Tschannen-Moran, 2018). Overall, the evidence reviewed indicates that school facilities influence students' academic performance through several interconnected pathways, including the provision of a conducive learning environment, improved access to instructional resources, enhanced teacher effectiveness, and the promotion of a positive school climate. However, the literature also emphasizes that the full benefits of school facilities can only be realized when they are adequately funded, properly maintained, effectively utilized, and supported by sound school leadership and educational policies (Ajayi & Ayodele, 2021; Earthman, 2014).

Research Question Three: What patterns emerge in literature on the use of research designs and geographical locations (foreign or local) in studies investigating the impact of school facilities on students' academic performance in Secondary Schools?

The reviewed literature reveals several noticeable patterns in the research designs employed and the geographical locations where studies on school facilities and students' academic performance have been conducted. These patterns help to explain how researchers have approached the topic over time and provide insight into the contexts in which the existing evidence has been generated. One of the most consistent patterns is the widespread use of quantitative research designs. Most of the reviewed studies adopted descriptive survey, correlational, ex post facto, or cross-sectional research designs. These approaches were preferred because they enabled researchers to examine the relationship between school facilities and students' academic performance using large samples without manipulating the study variables. Among these designs, correlational and ex post facto approaches appeared most frequently, reflecting their suitability for investigating educational issues in real school settings where experimental studies are often difficult to conduct (Schneider, 2012; Owoeye & Yara, 2021). Although less common, a number of studies employed qualitative and mixed-methods approaches. These studies provided deeper insights into how school facilities influence teaching and learning by exploring the experiences and opinions of teachers, school administrators, and students. By combining statistical findings with participants' perspectives, these studies offered a more comprehensive understanding of how the availability, utilization, and maintenance of school facilities affect educational outcomes (Uline & Tschannen-Moran, 2018). The review also shows a clear pattern regarding the geographical distribution of the studies. Both foreign and local studies consistently reported that school facilities have a positive influence on students' academic performance. However, the focus of the studies differed according to their contexts. Foreign studies, particularly those conducted in developed countries, tended to emphasize the quality, modernization, technological advancement, and sustainability of school facilities. These studies frequently examined how modern learning environments, innovative classroom designs, digital technologies, and positive school climates contribute to improved student achievement (Earthman, 2014; Maxwell, 2016). In contrast, local studies, especially those conducted in Nigeria and other developing countries, focused more on the availability, adequacy, maintenance, and effective utilization of basic educational facilities. Many of these studies identified challenges such as overcrowded classrooms, inadequate laboratories, poorly equipped libraries, insufficient furniture, and limited ICT

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resources as major factors affecting students' academic performance. Despite these differences in emphasis, local studies consistently concluded that improving school facilities leads to better learning outcomes and higher academic achievement (Ajayi & Ayodele, 2021; Owoeye & Yara, 2021). Another important trend observed in the reviewed literature is the increasing geographical diversity of research on school facilities. While earlier studies were largely conducted in North America and Europe, more recent research has increasingly emerged from Africa, Asia, and other developing regions. This growing diversity reflects a wider recognition of the importance of school infrastructure in achieving quality education across different educational systems and socio-economic contexts. Overall, the reviewed literature suggests that quantitative research designs remain the most commonly used approach for investigating the relationship between school facilities and students' academic performance. At the same time, evidence from both foreign and local studies consistently demonstrates the importance of quality school facilities in promoting academic success. Although the challenges and priorities differ across countries, the findings point to the same conclusion: providing adequate, functional, and well-managed school facilities is essential for improving teaching, supporting learning, and enhancing students' academic performance.

Conclusion

This systematic literature review synthesized empirical evidence on the impact of school facilities on students' academic performance in secondary schools. The findings consistently demonstrate that school facilities are an essential component of quality education and play a significant role in improving students' academic achievement. The review showed that the availability, adequacy, quality, functionality, and proper maintenance of facilities such as classrooms, science laboratories, libraries, ICT facilities, workshops, furniture, sanitation facilities, and other school infrastructure create conducive learning environments that enhance teaching effectiveness and students' learning outcomes. The review further established that school facilities influence academic performance through multiple pathways, including improved student motivation, increased classroom participation, better attendance, enhanced teacher effectiveness, and the creation of a positive school climate. However, the findings also indicate that the mere provision of school facilities is insufficient to guarantee improved academic performance. Their effectiveness depends on proper utilization, regular maintenance, equitable distribution of resources, effective school leadership, teacher commitment, and sustained government investment. In addition, the review identified important methodological and geographical patterns in the existing literature. Quantitative research designs, particularly descriptive survey, correlational, ex post facto, and cross-sectional designs, were the most commonly employed approaches, while qualitative and mixed-methods studies provided complementary insights into the experiences and perceptions of educational stakeholders. The review also found that although foreign and local studies differed in their contextual focus, they consistently reached the conclusion that quality school facilities positively influence students' academic performance. Overall, the evidence synthesized in this review demonstrates that improving school facilities remains a strategic investment for enhancing educational quality in secondary schools. The study therefore concludes that governments, school proprietors, educational planners, development partners, and school administrators should prioritize the provision, maintenance, effective management, and equitable distribution of school facilities to create learning environments that support effective teaching, promote students' academic success, and contribute to the achievement of national educational goals.

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