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Special Facilities in Elementary School Laboratories: Characteristics and Physical Components that Support Learning

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Abstract: This study aims to examine specialized laboratory facilities in elementary schools, focusing on their physical characteristics and components in supporting student learning. The background of this study is based on the importance of a learning environment that is appropriate for the developmental stage of elementary school students, who are still in the concrete operational stage and therefore require learning experiences that are hands-on, contextual, and interactive. Emerging issues indicate that laboratory facilities in elementary schools are often not optimally designed, whether in terms of accessibility, simplicity, or visual appeal, and thus fail to sufficiently support student engagement in learning. This study employs a descriptive qualitative approach using a literature review method. Data were obtained from various academic sources such as books, scientific journals, and educational policy documents, and were then analyzed using content analysis techniques to identify key themes related to laboratory facilities. The results of the study indicate that elementary school laboratory facilities need to be accessible, simple, functional, visually appealing, and flexible. Supporting physical components include student work areas, open storage, educational displays, exploration corners, and adequate lighting and ventilation. Well-designed facilities contribute to students' comfort and engagement in learning, thereby playing a crucial role in creating an effective and meaningful learning environment.

Keywords: Special Facilities; School Laboratories; Characteristics; Physical Components; Learning Support.

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Introduction

To effectively deliver education in elementary schools, there is a need for a learning environment that optimally supports student development, (Agustina & Masyithoh, 2025). At this stage in students' lives, concrete experiences, hands-on exploration, and active interaction with their environment are crucial, (Dina *et al*., 2025). Learning success depends on a quality learning environment.

One type of learning environment that can be particularly helpful in meeting these needs is the elementary school laboratory, (Arvianti *et al*., 2024). Laboratory practices, however, are often limited to the same formal experimental spaces used in higher education. In elementary schools, this perspective leads to the creation of laboratory facilities that do not take student characteristics into account. Consequently, the available facilities sometimes fail to meet students' learning needs, (Mutia *et al*., 2025)

In addition, there is a tendency for schools to use generic laboratory facility designs without considering ergonomics, accessibility, and visual appeal, (Saputri & Fatmawati, 2024). Laboratories do not become enjoyable and interactive learning spaces. Sometimes, the available facilities go unused because they do not meet students' needs and circumstances, (Husna *et al*., 2025).

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Facilities that support active learning processes are necessary due to the demands of 21st-century learning, which emphasize creativity, problem-solving, and critical thinking, (Rahmaniati, 2026). Under these conditions, well-designed laboratories are crucial for the learning process. They are not merely an addition but an integral part of the learning process, (Eny Hartadiyati *et a*l., 2023).

Given this situation, more in-depth research on elementary school laboratory facilities is needed. Specifically, this research should focus on the physical features and elements that support learning, (Sita *et al*., 2024). It is hoped that this research will provide a broader understanding of how to create facilities that meet students' needs.

Method

This study employs a descriptive qualitative approach using a literature review methodology. This method was chosen because it allows the author to examine various theoretical concepts and research findings relevant to the subject of elementary school laboratory facilities.

The data were drawn from various types of academic literature, including educational books, scientific journals, and policy documents related to basic education facilities and infrastructure. Subsequently, the collected data was analyzed using content analysis. This identified key themes related to the features and physical elements of laboratory facilities.

The analysis was conducted systematically through several steps: data reduction, concept grouping, presentation in the form of descriptive narratives, and drawing conclusions. Without relying on specific situations, this method allows for in-depth and organized discussion.

Result and Discussion

Characteristics of Elementary School Laboratory Facilities

Since elementary school students are still in the concrete operational stage, each laboratory must be designed with their developmental needs in mind, (Panesha, 2025). At this stage, hands-on experiences and interactions with real objects help students understand concepts. Consequently, the facilities provided must be able to support simple yet meaningful exploratory activities.

One key feature is accessibility, which allows students to use the facilities easily. Equipment and supplies must be sized and positioned to suit students' physical stature. This is crucial for fostering individual independence and reducing reliance on teachers, (Yanto, 2025). The next two features are simplicity and effectiveness. According to (Mardiana, 2025), laboratory facilities do not need to be complex or expensive, but they must have a clear purpose to help students learn. Simplicity makes it easier for students to use the tools and avoids confusion, (Syafei, 2025).

Visual appeal is a key factor. If the learning environment is visually engaging, students may be more motivated to learn. According to (Riyanto, 2025), we can make the classroom enjoyable without compromising its academic value by using colors, images, and educational decorative elements.

Another important factor is spatial flexibility, which allows the space to be used for various types of learning activities. A flexible space allows for adjustments according to the learning needs of individuals and groups, (Yuwono *et al*., 2024).

Physical Components of Elementary School Laboratory Facilities

Physical components must be designed to be simple, safe, and easily accessible for elementary schools because these components are physically present and directly used during learning, (Mana, 2025). It is crucial that student work areas—typically desks or flat surfaces used for various activities—be sufficiently spacious, stable, and easy to clean. The arrangement of work areas should consider student interactions to support group work, (Ismara, 2024). Next are storage systems, such as open shelves and cabinets. Open storage allows students to see and understand the available tools or materials, which fosters their interest and engagement. According to (Rasyid, 2025), this system also helps students understand the orderliness of their learning environment.

Educational displays are crucial in a laboratory setting. These are spaces where students' learning outcomes, learning materials, and other visual aids can be showcased (Sidik *et al*., 2023). The primary goal is to allow students to appreciate their learning outcomes and enhance their learning experience through visualization, (Putri *et al*., 2025).

The space exploration corner allows students to see and touch various contextual objects. These corners enable students to learn directly from objects in their environment, such as rocks, plants, or everyday items, (Wahab *et al*., 2021).

Lighting and ventilation also help, although they are often considered secondary, (Nurhayati *et al*., 2025). Students will feel more comfortable and more focused if the space is well-lit and has good air circulation,, (Suruambo *et al*., 2025).

The Relationship Between Physical Facilities and Comfort and Learning Engagement

Well-designed facilities significantly influence students' comfort and their engagement in the learning

process. In a comfortable and engaging environment, students will be more focused, (Yuniar Aprilia, 2025).

Students will be more active in learning if the facilities are easy to use and safe, (Razita *et al*., 2025). Students will be more active in learning if the facilities are easy to use and safe.

The extent to which students can interact directly with available facilities also influences their learning engagement, (Fitrianti, 2025). Facilities that allow for direct manipulation enhance students' understanding compared to passive learning, (Kasi, 2023).

Therefore, there is a mutually supportive relationship between the learning process and physical facilities. The quality of learning is influenced by a good learning environment.

The Principle of Developing Simple and Effective Facilities

Elementary schools do not need to build laboratories with substantial resources; even small facilities can influence learning, (Ananda *et al*., 2025). Contextuality—meaning the use of the surrounding environment as a learning facility—is a key principle. This approach not only saves money but also brings education closer to students, (Syafitri *et al*., 2021). Next is the principle of efficiency, meaning that facilities are designed to function well without being excessive. Every component must have a clear purpose and be fully utilized, (Fitria *et al*., 2025).

Students must be involved in the development and use of facilities based on the principle of participation. This involvement can enhance a sense of ownership and responsibility toward the learning environment, (Husna *et al*., 2025). By applying these principles, laboratories can be developed gradually yet effectively.

Conclusion

Laboratories in elementary schools are an important component of a learning environment that supports student growth. To increase student participation, facilities must be user-friendly, simple, and engaging. Physical elements such as work areas, storage, educational displays, and exploration corners are designed to be both functional and contextually relevant. Furthermore, the relationship between facilities and learning ease indicates that the physical environment has a significant impact on the quality of learning.

In addition to providing appropriate physical facilities, the effective utilization of laboratory spaces is essential to support student learning. Laboratory facilities can be used for hands-on activities, scientific exploration, collaborative learning, observation, experimentation, and project-based learning. The integration of these activities enables students to develop critical thinking, problem-solving skills, creativity, and a deeper understanding of learning concepts through direct experience.

Elementary school laboratories can serve as effective learning spaces even with limited resources by employing a simple yet targeted development approach. Therefore, prioritizing facility design and components is a crucial step toward improving the quality of elementary education.

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References

Agustina, L. A., & Masyithoh, S. (2025). The influence of the school environment on student academic achievement in elementary schools: A literature review. Journal of Education and Teaching, 3(3), 692–702.

Ananda, R., Meiwati, L., Lestari, Y., & Anum, F. (2025). The relationship between facilities and infrastructure and the quality of learning in elementary schools. Pendas: Scientific Journal of Elementary Education, 10(2), 572–582.

Arvianti, L. A., Afifi, E. H. N., & Keliata, K. (2024). Elementary school teachers' initiatives to provide science media and lab materials amid limited laboratory facilities. Search: Science Education Research Journal, 2(2), 102–114.

Dina, S. N., Prayogo, M. S., Andiyani, S. A. P., & Maulida, I. (2025). The Effectiveness of the Discovery Learning Model Assisted by the Surrounding Environment in Improving Learning Outcomes in Biology (Plant and Their Functions) for Third-Grade Students at MI Al Barokah Jember. Algoritma: Journal of Mathematics, Natural Sciences, Earth and Space Sciences, 3(6), 32–41.

Eny Hartadiyati, W., Firdaus, D. H., Lestari, S. A., & Savitri, S. A. (2023). Classroom Management in Laboratory-Based Practical Learning Methods. BIOFAIR, 118–137.

Fitria, E. D., Julian, P. D., & Hidayat, Y. (2025). Basic Concepts of Educational Facilities and Infrastructure: An Analysis of the Objectives and Principles of Educational Facilities and Infrastructure Management. Literasi: Journal of Innovation Literacy Studies, 2(2), 331–338.

Fitrianti, N. H. (2025). THE ROLE OF TEACHERS IN ENHANCING LEARNING ENGAGEMENT, 64–73. https://doi.org/10.37905/dej.v5i1.2788

Husna, M., Utami, Y. L., Elrfhentri, F., Septiani, N., & Khosi'in, K. (2025). The Relationship Between School Facilities and the Physical Environment on Student Learning Motivation. Ainara Journal (Journal of Research and PKM in the Field of Education), 6(2), 302–312.

Ismara, I. (2024). Principles of Occupational Safety and Health in Vocational High School Workbooks.

.Kasi, R. (2023). Active learning: Encouraging student participation.

Mana, L. H. A. (2025). Instructional Media. Dunia Penerbitan buku.

Mardiana, P. (2025). DEVELOPMENT OF THE CHEMISTRY LABORATORY MANAGEMENT INFORMATION SERVICE SYSTEM (SLIM KILAB) AS A MODEL FOR CHEMISTRY LABORATORY MANAGEMENT IN HIGH SCHOOLS THROUGHOUT THE SUB-DISTRICT. UNIVERSITY OF LAMPUNG.

Mutia, N., Sismia, T. N. Z., Ramadhani, K. R., & Suryapuspita, A. (2025). A Comparison of Student Learning Motivation Through Lecture and Digital Methods. Journal of Education and Learning, 4(02).

Nurhayati, C. E., Ramdini, D., Nurazijah, M., Hayati, N. A., & Nurbayanti, S. (2025). CLASSROOM MANAGEMENT AS A SUPPORT FOR LEARNING EFFECTIVENESS IN ELEMENTARY SCHOOLS. Didaktik: Scientific Journal of PGSD STKIP Subang, 11(03), 240–254.

Panesha, N. (2025). Stages of Student Development and Their Characteristics During Elementary School in Grade 2 at SDN I Kubangdeleg. Nusantara: Journal of Education, Arts, Science, and Social Humanities, 3(01).

Putri, F. D., Putri, M., & Syahputra, A. (2025). UTILIZATION OF AUGMENTED REALITY-BASED LEARNING MEDIA TO ENHANCE STUDENT MOTIVATION AND LEARNING OUTCOMES. Pendas: Scientific Journal of Primary Education, 10(04), 216–230.

Rahmaniati, R. (2026). 21st-Century Skills-Based Learning Methods. Uwais Inspirasi Indonesia.

Rasyid, F. (2025). DEVELOPMENT OF ANDROID-BASED INTERACTIVE LEARNING MEDIA USING A MODIFIED BARCODE SYSTEM WITH RECYCLED MATERIALS FOR STATISTICS COURSES AT NABIRE PUBLIC JUNIOR HIGH SCHOOL 2. PGRI Adi Buana University, Surabaya.

Razita, F. A., Pawestri, A. S. H., Sabilillah, E., Kenari, R. W., & Saputri, Y. (2025). Students' Perceptions of Teachers' Roles and the Learning Environment in Enhancing Learning Engagement and Comfort. Sindoro: Cendikia Pendidikan, 16(4), 51–60.

Riyanto, O. R. (2025). Educational Multimedia. CV. Zenius Publisher.

Saputri, I., & Fatmawati, F. (2024). Issues in the Management of Facilities and Infrastructure in Education. Innovations in Multidisciplinary Education Journal, 1(1), 29–33.

Sidik, N. A. H., Fahmi, F., Umami, K., & Akbar, Z. (2023). Learning Media (An Introduction to Educational Resources). Mega Press Nusantara.

Sita, F., Muttaqin, M. S., & Bhinika, P. (2024). Strategies for managing school facilities and resources to improve the quality of learning. NOVARA: Nusantara Innovation and Educational Technology, 1(3), 117–132.

Suruambo, J., Alim, J., Indrawan, Y., & Safaat, S. (2025). Classroom Arrangement in Elementary Schools to Improve Learning Quality. Journal of Human and Education (JAHE), 5(1), 338–343.

Syafei, I. (2025). Learning Media. Widina Publishers.

Syafitri, L., Asmawati, H. R., & Hartati, L. (2021). The Effect of Online Learning Methods on the Intelligence Levels of Elementary School Children During the Covid-19 Pandemic. Prima Portal Ris Dan Inov Pengabdi Masy, 1(1), 57–68.

Wahab, A., Junaedi, S. P., Efendi, D., Prastyo, H., PMat, M., Sari, D. P., Syukriani, A., Febriyanni, R., Rawa, N. R., & Saija, L. M. (2021). Mathematics Learning Media. Muhammad Zaini Publishing Foundation.

Yanto, M. (2025). Management of Educational Facilities and Infrastructure. CV Eureka Media Aksara.

Yuniar Aprilia, R. (2025). Managing Teacher Learning in the Classroom to Create a Pleasant and Comfortable Environment: Strategic Approaches. Elementary School Education Management: Technology and Neuroscience-Based Approaches in the Merdeka Curriculum, 133.

Yuwono, I., Sari, K., Putri, M. R. N., & Dewi, R. (2024). Flexible Learning for Children with Special Needs. Kamiya Jaya Aquatic.