IPRPD
International Journal of Arts, Humanities and Social Sciences
ISSN 2693-2547 (Print), 2693-2555 (Online)
Volume 06; Issue no 08: August 2025
DOI: 10.56734/ijahss.v6n8a13

DESIGNING OUTDOOR LEARNING ENVIRONMENTS FOR PRIMARY EDUCATION IN MALAWI

Christian Bassaw[1], Mohadesehsadat Rahimi[2], Michelle Pearson, Ph.D[3]

[1]BSc. Arch, P.G. Dip. Arch, PMP, LEED Green Associate, Doctoral Student, Department of Design, Texas Tech University

[2]BSc. Arch, M. Sc. ENVD, LEED Green Associate, Department of Design, Texas Tech University

[3]Associate Chair, Associate Professor, Interior Design Program Director, Department of Design, Texas Tech University

Abstract

This paper investigates the design of a primary school in Mvera, Malawi, with a focus on Outdoor Learning Environments (OLE) to enhance the educational experience. It explores how natural, culturally relevant educational environments can support creativity, problem-solving, environmental awareness, and holistic child development. Situated in one of the world's least developed countries, Malawi faces significant challenges, including low income levels and limited infrastructure. In response, the proposed design offers an environmentally sensitive and contextually appropriate solution. Key features include shaded outdoor classrooms, multifunctional courtyards, and play areas that support motor skill development and experiential learning. The integration of indigenous play activities encourages group learning and reflects the local culture. Grounded in a review of literature on outdoor education, cultural relevance, and sustainable architecture, the paper presents design recommendations tailored to Malawi's environmental and cultural context.

The findings underscore the transformative potential of outdoor learning environments (OLE), particularly in resource-constrained regions, and highlight the importance of integrating traditional practices with sustainable design solutions. Ultimately, this research advocates for an integrated approach to school design that strengthens environmental connection while supporting children's physical, cognitive, and social development.

Keywords

Outdoor Learning Environment (OLE), Sustainable School Design, Green Architecture, Culturally Responsive Design, African Educational Architecture, Malawi, and Sub-Saharan Africa

Introduction

The built environment of educational spaces has a positive influence on how students learn, interact, and develop cognitively and socially (Marchant et al., 2019; Mirrahimi et al., 2011). Schools are not merely containers for instruction but active contributors to the learning process (Lippman, 2010). There is a growing need towards creating learning environments that support holistic development through spatial, sensory, and culturally responsive design (Finnegan, 2020; Lyoka, 2007; Marfo & Biersteker, 2011). However, most studies examining the impact of learning environments have been conducted in developed or developing regions. This leaves the least developed countries – defined by low income, poor human assets, education, health, and nutrition, and economic fragility resulting from instability, limited diversification, and structural constraints (UN CDP, 2021; World Bank, 2018) – like Malawi, with limited evidence on this subject.

Malawi's educational system, which serves 4.4 million primary school students, representing 82% of primary and secondary education enrollment, faces numerous challenges, including overcrowded classrooms, inadequate infrastructure, and a lack of access to clean water and reliable energy (World Bank, 2020). Culturally, Malawians tend to enjoy being outdoors, and studies have shown that outdoor learning offers numerous benefits, including increased physical activity, improved mental health, and heightened creativity (Dowdell et al., 2011; Mirrahimi et al., 2011). Studies show that outdoor environments foster collaborative learning, enhance problem-

solving abilities, and promote environmental stewardship among students (Dowdell et al., 2011; Khan et al., 2020). One initiative that has gained recognition in the United States is Outdoor Learning Environments (OLE), which refers to an environment that extends the classroom into nature, fostering curiosity, creativity, and active participation, providing flexible, nature-integrated spaces that support experiential, active, and inquiry-based learning, particularly critical for young learners in their formative years (Dowdell, K. et al., 2011; Khan et al., 2020; Mirrahimi et al., 2011; Texas Department of State Health Services, 2025). Studies show outdoor environments improve cognitive performance and encourage collaboration through unstructured and imaginative play (Dowdell et al., 2011; Lyoka, 2007).

Despite the potential benefits, OLE best practices have been explored and implemented only in the United States. This paper explores how the design of a primary school in central Malawi can promote creativity, curiosity, motor skill development, problem-solving, and a deeper appreciation for nature through Outdoor Learning Environments (OLE). It examines how OLE principles can be thoughtfully adapted and applied in a setting where outdoor learning already aligns with local cultural practices.

RQ1: How can OLE principles be integrated into a Malawian primary school context to create a culturally responsive design?

Method

Literature Search and Selection Criteria

This study employed a five-stage thematic literature review methodology, including identification, screening, eligibility, inclusion, and synthesis, to explore the role of Outdoor Learning Environments (OLE) in sustainable and culturally responsive school design in Malawi. A comprehensive search was conducted across multiple databases, including Art & Architectural Source, JSTOR, Google Scholar, PsycINFO, SAGE Journals, Scopus, and Education Research Complete. Boolean operators and targeted keywords were used, including: ("Outdoor Learning Environment" OR "OLE") AND ("Sustainable School Design" OR "Green Architecture") AND ("Culturally Responsive Design" OR "African Educational Architecture") AND ("Malawi" OR "Sub-Saharan Africa"). The initial search yielded 1,387 records. After removing duplicates, 137 studies were screened based on the relevance of their titles and abstracts. Studies were included if they focused on outdoor learning, sustainable educational spaces, or cultural integration in school design within African or similar low-resource contexts. A total of 51 full-text studies were thoroughly reviewed. Ultimately, 26 sources were selected for synthesis based on their methodological rigor, thematic relevance, and contextual applicability to Malawi's educational and environmental conditions.

Selection of School and Design Development

An existing primary school campus in Mvera, central Malawi, was selected for this research. The selected campus provided a representative example of the infrastructural and environmental challenges many schools in rural Malawi face, including limited resources, overcrowded classrooms, and adverse climatic conditions. Throughout the design process, the researchers worked closely with the client, an NGO focused on educational infrastructure in Malawi, to ensure that the proposed design solutions meet the community's academic and functional needs. The collaboration included indirect consultations with local educators and stakeholders to gather information on the site and the community's unique needs and preferences. Building on the insights from the literature review and consultations, detailed building designs and site plans were developed for the school campus. The design incorporated outdoor learning spaces, such as shaded courtyards and play areas, to foster experiential learning and creativity. These plans were then overlaid with sustainable building practices, addressing the region's environmental challenges, such as water scarcity and high temperatures, and incorporating local materials to ensure cultural relevance.

Literature Review

Education in Underdeveloped Countries

Underdeveloped or least developed nations are characterized by low income, limited human assets, poor education, health, and nutrition, as well as economic fragility stemming from instability and limited diversification (UN CDP, 2021; World Bank, 2018). Like Malawi and similar regions grappling with poverty and limited resources, primary school students in these areas are often susceptible to absenteeism from school and lower academic performance (UNICEF, 2022). According to the report, the school completion rate in Malawi stands at 33%, indicating that most children do not complete their education. In institutions where resources and infrastructure are scarce, these challenges are exacerbated. A study by Khan et al. (2019) found that schools in developing nations often have crowded, poorly designed classrooms, where both students and teachers lack the necessary resources for quality education. The researchers suggested that the conventional classroom layout, with rows of desks facing a chalkboard, hinders collaborative learning experiences, thus limiting teachers from utilizing effective teaching

methods or adapting to students' needs. In these settings, outdoor education provides a versatile alternative to conventional classroom settings (Khan et al., 2019).

Research indicates that outdoor learning spaces promote teamwork, creativity, and hands-on experiences, offering significant potential to enhance educational outcomes in developing countries (Dowdell et al., 2011). For example, according to Khan et al. (2020), children in outdoor environments become more attuned to their surroundings, engaging in exploration and discovery that supports independent learning. Conversely, they argued that barren or poorly designed school grounds fail to inspire such engagement, highlighting the importance of outdoor learning environments.

Play and Culturally Responsive Design

Play is a universal feature of childhood, but cultural contexts deeply influence its forms and functions (Marfo & Biersteker, 2011). Marfo and Biersteker (2011) argued that, in African societies, play is often intertwined with cultural traditions, reflecting local values and promoting skills necessary for community life. They highlighted that the imposition of Western-style schooling, rooted in colonial systems, often creates a disconnect between education and local traditions, undermining its relevance and productivity in non-Western contexts.

Adapting play-based learning to African settings requires more than simply incorporating local games and songs. A systematic approach is needed to analyze and integrate cultural assets into educational curricula. Play activities in African societies are often rooted in adults' daily lives, with children replicating these tasks in imaginative ways that promote cognitive, linguistic, and social development (Marfo & Biersteker, 2011). For instance, the authors provide an example from Ghana, where children transform chores like fetching water into playful activities, such as building simple vehicles to make the task enjoyable. This integration of work and play reflects a holistic approach to education, where learning happens naturally within community contexts.

Studies on play in African societies also highlight its cooperative and unsupervised nature. Marfo & Biersteker (2011) stated that, unlike the Western emphasis on mother-child play for cognitive development, children in African cultures learn primarily from peers and older siblings. This mixed-age, collaborative play fosters creativity, problem-solving, and social skills. However, when play is overly structured in formal educational settings, it risks losing its spontaneity and the natural learning opportunities it provides (Marfo & Biersteker, 2011).

Holistic Learning Environments

Enhancing Engagement and Creativity

In Malawi's rural context, where children are closely connected to the natural world, outdoor classrooms and learning courtyards that support lessons in natural ecosystems, weather patterns, and sustainable agriculture (Dowdell et al., 2011; Khan et al., 2020; Merewether, 2015; World Bank, 2020). Exposure to natural environments enables students to explore, collaborate, and solve problems, thereby enhancing engagement and enthusiasm (Mirrahimi et al., 2011). Children in outdoor settings frequently engage in activities that enable them to invent, build, and experiment freely, thereby promoting critical thinking and teamwork. Teachers' involvement in fostering this curiosity ensures that students develop a lasting appreciation for the beauty and wonder of the natural world (Dowdell et al., 2011).

Experiential Learning and Problem-Solving

Play in African societies is more than imitation; it involves using language, humor, and creativity to reflect on adult behaviors and societal norms (Marfo & Biersteker, 2011). According to Marfo & Biersteker (2011), children acquire essential cognitive, social, and ethical values through leader selection, secret language development, and game invention. Outdoor environments further support these processes by offering spaces for exploration and problem-solving, often involving unpredictability and risk (Dowdell et al., 2011). For instance, in Bangladesh, students taught science outdoors in an amphitheater setting reported higher engagement and academic performance than those in traditional classrooms (Khan et al., 2019), demonstrating the potential of outdoor learning across diverse contexts.

Motor development and sensory stimulation

Children's physical and cognitive development dramatically benefits from movement activities such as climbing and running (Marchant et al., 2019; Mirrahimi et al., 2011). They enhance motor skills and coordination while supporting classroom learning by improving focus and reducing fatigue (Lyoka, 2007; Nel et al., 2017). According to Mirrahimi et al. (2011) and Marchant et al. (2019), outdoor settings offer experiences that enhance children's senses and perceptual and cognitive skills. The authors argued that, for instance, touching tree bark or trying plants can help students engage more effectively with their surroundings and enhance their learning experience. When natural landscapes are unavailable, jungle gyms or climbing walls can be added to challenge children's motor skill development (Dowdell et al., 2011; Khan et al., 2020).

Appreciation for Nature and Environmental Care

Exposure to nature during childhood is critical in the development of young children (Boulton & Thomas, 2022; Cooper, 2015). For example, gardening activities allow students to learn about nutrition and sustainable practices while fostering a deeper connection to their environment (Mirrahimi et al., 2011). Outdoor learning spaces offer a unique opportunity to integrate environmental education into the curriculum, promoting hands-on learning experiences. Additionally, teachers play a crucial role in modeling appreciation for the natural world, inspiring students to care for their surroundings and adopt sustainable practices (Dowdell et al., 2011). By reconnecting children with nature, these spaces help foster a generation that values and protects the natural world, ensuring a sustainable future. However, socioeconomic challenges, crime, and violence often limit children's access to nature, particularly in African societies (Adams & Savahl, 2015).

OLE as a Framework for Active Learning

Benefits of Outdoor Learning Environments

OLE extends the classroom into nature, fostering curiosity, creativity, and active participation, and can boost student involvement and innovation while promoting education (Dowdell et al., 2011; Khan et al., 2020). Such environments allow students to engage directly with their surroundings (Lyoka, 2007). This hands-on approach encourages growth in learners and is considered essential in primary education (Khan et al., 2020). Although expansive green spaces allow children to learn and grow, they may sometimes lack essential elements, such as shade and shelter, which can restrict their involvement and participation in outdoor activities (Dowell et al., 2011). Outdoor learning transcends traditional educational boundaries by employing a cross-curricular approach that supports well-being, creativity, and cognitive development (Boulton & Thomas, 2022; Cooper, 2015; Marchant et al., 2019; Mirrahimi et al., 2011). The physical, mental, and emotional benefits of outdoor education emphasize its role in enhancing concentration, creativity, and problem-solving skills (Marchant et al., 2019). It also enhances engagement, skill acquisition, and enjoyment, thereby enriching students' educational experiences (Marchant et al., 2019; Mirrahimi et al., 2011). OLEs also strengthen the connection between play and learning by promoting active, imaginative, and constructive play (Cooper, 2015; Dowdell et al., 2011). Nature-based learning introduces children to their natural surroundings, fostering ecological awareness (Mirrahimi et al., 2011). Engaging with nature has been shown to improve academic performance, language skills, cooperation, and understanding of ecological systems (Dowdell et al., 2011; Mirrahimi et al., 2011).

OLE Key Features and Design Principles

Play Settings

Outdoor environments must include play settings stimulating children's natural curiosity and creativity (Lyoka, 2007; Olsen et al., 2010). Discovery play areas, such as stages, gazebos, decks, and amphitheaters, support role-playing and imaginative activities (White & Stoecklin, 1998). Art installations, such as easels and woodworking tables, encourage self-expression and artistic exploration (Olsen et al., 2010; White & Stoecklin, 1998). Additionally, White & Stoecklin (1998) emphasized that an interactive water play area can be established in a bog or stream habitat, where natural elements such as plants, soil, sand, and water provide settings for open-ended, unstructured play that encourages creativity and exploration. Unlike fixed play structures, natural materials enable manipulation and complex play, encouraging discovery, pretend play, and imagination (Cooper, 2015; White & Stoecklin, 1998).

Looping, Curvy Pathway

According to Moore et al. (2014), pathways designed with looping and curving patterns guide children through diverse activity zones, thereby fostering engagement and physical activity. The authors state that these pathways connect various spaces, allowing for seamless movement and offering flexibility in how children interact with their environment.

Natural and Loose Materials

According to White & Stoecklin (1998), access to loose natural materials, such as sticks, stones, and leaves, enables children to manipulate their surroundings, encouraging creative and sensory-rich play. Such elements foster flexible problem-solving and social interaction, aligning with Nicholson's loose parts theory, which links creativity and discovery to the variety of elements in a play environment (White & Stoecklin, 1998).

Wheeled Toys and Portable Play Equipment

Portable items, such as wheeled toys, sand tools, and musical instruments, allow children to customize their play spaces, thereby enhancing autonomy and creativity (Moore et al., 2014). The authors argue that these tools promote dynamic physical play and social engagement.

Shade Structures and Outdoor Classrooms

According to Moore et al. (2014), shade and shelter are vital components of OLEs, ensuring comfort and protection from the elements. Shaded structures, small trees, and covered spaces offer areas for rest, group activities, and outdoor classrooms. These designs create functional and inviting environments for prolonged outdoor engagement (Moore et al., 2014).

Gross Motor Skills

Fixed or movable items, such as logs, rocks, or balance beams, support gross motor development (Cooper, 2015). These elements provide opportunities for essential activities, such as balancing, climbing, and lifting, which help children build physical strength and coordination (Moore et al., 2014). Physical development encompasses gross and fine motor skills, which are crucial for children's overall growth and coordination (Cooper, 2015). While often assumed to develop naturally, it is essential that playground and outdoor space designers intentionally incorporate equipment that supports these skills (Olsen et al., 2010).

Vegetation, Shrubs, Vines, and Ornamented Grasses

Shrubs and plants enhance spaces with color, variety, and engagement. Larger shrubs can create the illusion of smaller rooms, allowing for privacy and promoting various activities (Moore et al., 2014). Plants, such as logs, stumps, sticks, and branches, promote creativity and interaction with nature (Cooper, 2015). To maximize benefits, plants should align with the program's mission and values, thereby enhancing the outdoor curriculum and children's learning experience (Olsen et al., 2010).

Multi-Purpose Lawns

According to Cooper (2015), open outdoor play areas encourage children to move freely and engage in physical activities, providing a safe and spacious environment for the development of gross motor skills. Designing clear, unobstructed areas accessible from play equipment promotes flexibility for various activities, thereby enhancing physical health and social interaction among children, and fostering teamwork and collaboration (Olsen et al., 2010).

Edible Fruiting Species and Vegetable Garden

Nutritional learning in OLEs, such as incorporating edible landscapes, is crucial for children's health and eating habits, providing interactive learning experiences, teaching children about nutrition and the value of fresh produce (Moore et al., 2014). Vegetable gardens offer a dedicated space for children to engage in hands-on activities, enhancing their understanding of food origins and reducing picky eating behaviors. Through these activities, children gain a sense of responsibility, accomplishment, sustainability, and the importance of healthy eating choices (Cooper, 2015). Outdoor spaces serve as places for play and learning, fostering healthier lifestyle habits (Moore et al., 2014). By integrating these principles, OLE becomes a dynamic space that supports holistic development. They promote physical activity, creativity, and environmental awareness, ensuring children learn and grow harmoniously with their surroundings (Dowdell, K. et al., 2011; Khan, M. et al., 2020; Marchant, E. et al., 2019; Mirrahimi et al., 2011).

Safety Considerations

Outdoor learning spaces offer immense potential for primary schools in Malawi, given the country's favorable climate for outdoor activities. However, ensuring student safety remains a significant concern. Research suggests that safety issues tend to diminish as outdoor learning becomes routine, with students and teachers adapting to new boundaries and practices over time (Marchant, 2019). Schools must prioritize striking a balance between mitigating safety risks and the benefits of outdoor play and learning. An initial adjustment period is crucial to establish clear guidelines, after which discipline and the benefits of outdoor learning become more evident (Marchant, 2019).

In rural Malawi, student supervision is a critical safety measure, mainly because children sometimes leave school grounds during play. Fencing solutions, such as natural or built barriers, can address this concern while enhancing supervision (Nel et al., 2017). Additionally, attention must be given to vegetation in these outdoor spaces. Exotic plants, which may produce airborne pollen and trigger allergies, pose a health risk. Native, non-allergenic plant species are recommended to align with local ecosystems and minimize allergic reactions (Galán, 2024), ensuring a safer environment for all students.

Indigenous Games in Africa

The Role of Games in Learning and Development

Games create a structured yet flexible framework that encourages engagement and enjoyment, transforming behavior and perspectives (Abdulla, 2021). For early childhood development, activity-based areas that focus on creativity, such as dance, music, and play, are vital (Shallwani et al., 2018). In sub-Saharan Africa, limited access to electricity and high toy costs often lead children to engage in unstructured play using loose materials, such as sticks and stones (Davis, 2017). Loose-part play universally fosters creativity, problem-solving, and social skills, highlighting its value across cultural and socioeconomic contexts (Davis, 2017).

Cultural Context of Indigenous Games (IGs)

Indigenous games (IGs) are central to early socialization in African contexts, as they embed cultural practices into activities such as songs and traditional games (Cooper, 2015). These games reflect cultural values and enhance learning and development through imagination and social play (Marfo & Biersteker, 2011). For instance, verbal games, such as Malawi's Lion and Impala, utilize chants to guide players through a collaborative and engaging activity, thereby reinforcing oral traditions and linguistic skills (Finnegan, 2020). IGs allow children to experience cultural values while developing critical skills, including coordination, balance, and problem-solving (Marfo & Biersteker, 2011). Games like Rede require players to adapt quickly, evaluate options, and anticipate others' actions, fostering perceptual-motor skills and decision-making abilities (Lyoka, 2007). These activities lay a foundation for physical and social competence, blending cultural learning with personal development (Finnegan, 2020; Lyoka, 2007; Marfo & Biersteker, 2011).

Types of Indigenous Games

Indigenous games in Africa often involve diverse physical, cognitive, and social challenges (Lyoka, 2007). Some games, such as diphiri and rede, require expansive spaces for activities like sprinting and running, while others, like *koi* and skipping games, are suited to smaller areas with minimal equipment (Lyoka, 2007). Tagging games emphasize strategy over speed, while rhythmic skipping games integrate singing to develop memory, coordination, and teamwork. The structured play inherent in these games supports holistic child development (Finnegan, 2020; Marchant et al., 2019; Marfo & Biersteker, 2011; Mirrahimi et al., 2011). Counting-based games improve numerical skills, while rhythmic activities enhance coordination and timing. Frequent participation in IGs contributes to physical fitness, social skills, and cognitive abilities, offering a well-rounded approach to child development (Lyoka, 2007).

Broader Implications

Indigenous games preserve cultural heritage and present a powerful tool for enhancing educational practices (Marfo & Biersteker, 2011). By incorporating traditional games into outdoor learning spaces, schools can foster creativity, adaptability, and a deep sense of cultural identity among students (Finnegan, 2020). These activities enrich the learning environment and nurture essential life skills, ensuring children grow into well-rounded individuals equipped to navigate diverse contexts (Lyoka, 2007).

Findings and Design Recommendations

The following table summarizes key findings from the reviewed literature, organized by thematic focus. It highlights the relationships between outdoor learning environments and cultural relevance in the context of early childhood or primary schools. Each theme is accompanied by implications for design practice, recommendations, and supporting citations to guide future research.

Table 1 ***Design Features, Rationale, Recommendations, and Supporting Evidence for the Proposed Outdoor Learning Environment in Malawi***

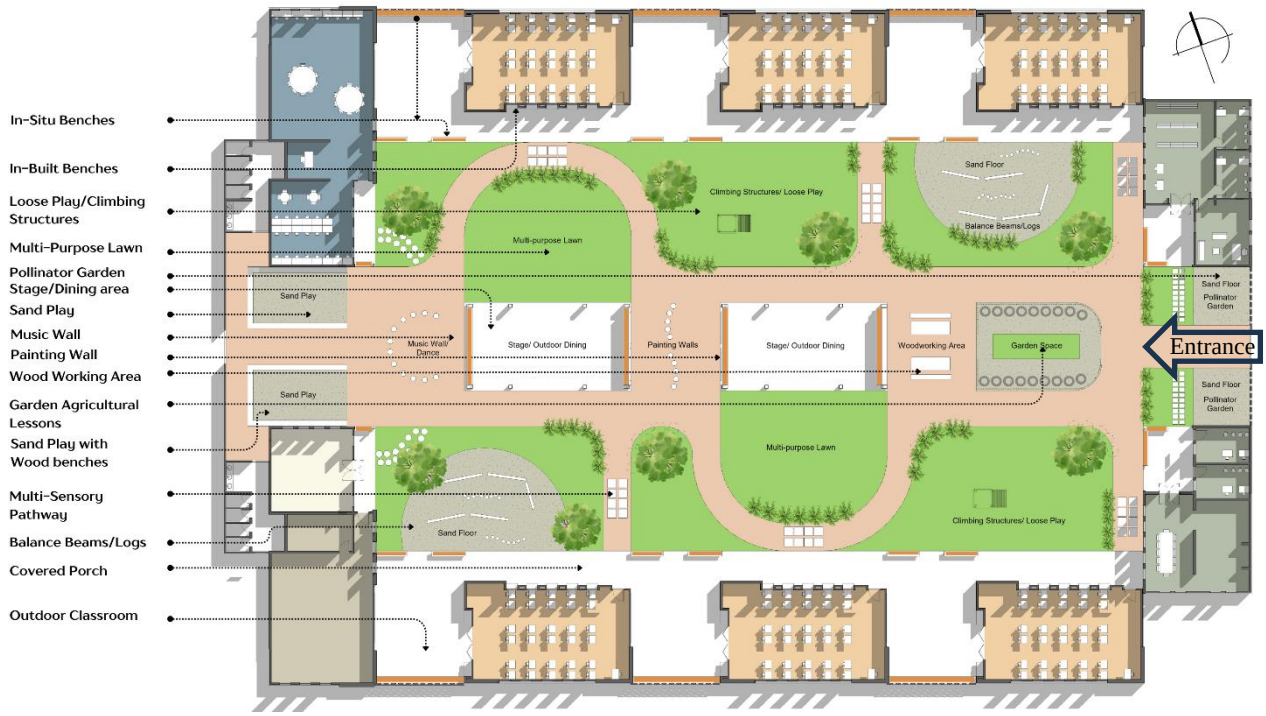
Concept	Design Considerations	Implications for School Design	Design Recommendations	Citations
Outdoor Learning Environments (OLE)	Integration of shaded outdoor classrooms, courtyards, and play areas for hands-on learning.	It enhances creativity, teamwork, and problem-solving and encourages active learning.	Design multifunctional outdoor spaces with shaded areas and flexible activity zones for diverse learning experiences.	Dowdell et al. (2011); Khan et al. (2020)
Culturally Responsive Design	Incorporating traditional Malawian play and social structures into the design.	Strengthens cultural identity and the relevance of education.	Integrate culturally significant design elements, such as community gathering spaces and traditional play areas.	Finnegan, (2020); Marfo & Biersteker, (2011)

Play-Based Learning	Design spaces that encourage natural, unstructured play with natural materials.	Fosters creativity, motor skills, and social interactions through culturally relevant games.	Provide open, flexible play areas with natural elements such as loose parts (stones, sticks) to support imaginative play.	Lyoka, (2007);
Experiential Learning	Include elements like gardens, climbing structures, and sensory-rich environments.	Promotes cognitive and physical development, environmental awareness, and hands-on problem solving.	Integrate garden spaces for hands-on learning about agriculture and the environment, as well as physical structures like climbing walls.	Mirrahimi et al. (2011); Marchant et al. (2019)
Safety Considerations	Utilize fencing, select suitable plant species, and establish clear boundaries for outdoor spaces.	Ensures students' safety while maximizing engagement in outdoor learning.	Install safe, natural fencing and select non-allergenic, locally sourced plants to minimize safety hazards and health risks.	White & Stoecklin (1998); Shallwani et al. (2018)
Indigenous Games in Education	Design areas for indigenous games, such as running, skipping, and collaborative activities	Reinforces cultural traditions and supports physical, social, and cognitive development.	Create dedicated spaces for indigenous games and activities, incorporating elements such as running tracks or open fields for traditional games.	Finnegan (2020); Marfo & Biersteker, (2011)

The table encapsulates diverse insights on integrating outdoor learning and cultural relevance in Malawian primary school design. These findings underscore the need for environmentally responsive, community-centered approaches prioritizing children's development and local traditions. The recommendations offer actionable strategies for creating adaptable, resource-efficient outdoor learning environments that bridge educational outcomes with ecological and cultural sustainability.

Developed Design: Outdoor Learning Space

Figure 1 ***Developed Master Plan***



Many of the concepts discussed in this study are incorporated in the outdoor space designed for a primary school in Malawi, Africa. The school has six modular classroom buildings, a library, a computer room, an office building, a teacher's building, and a resource storage facility. One of the project's primary objectives is to promote outdoor learning and experiences by designing spaces that foster creativity, hands-on learning, environmental education, and encourage the development of problem-solving skills.

Looping pathways in the school provide easy access to water. Shaded areas located in the center of the site are multi-functional. Shade is provided to protect children from sunlight while they perform, dance, and dine. School authorities can also utilize the shaded central space as a stage for speeches. Built-in benches are located throughout the outdoor area and are used by students, teachers, families, and the local community when invited to the school.

There are two large, open, grassy areas in front of the shaded multi-functional area, perfect for gathering and free play. Indigenous games can be played in the open grassy area, including running, standing in circles, dancing, and rope jumping. Natural loose parts and climbing structures are designed to encourage children to engage in higher levels of physical activity and promote experiential learning. Balance logs and beams are made locally and naturally, providing opportunities for physical activity and motor skills.

Pollinator garden space is designed at the main entrance to stimulate students' and visitors' visual and olfactory senses. Vegetable and edible plants are dedicated to a separate space, enclosed by bamboo fences to provide a more controlled environment. Children can visit this area at designated times to learn about gardening and environmental care. Fruit trees are in different parts of the outdoor space. Local vegetation and shrubs are planted in select areas around the play and learning spaces to provide defined access to the space and enhance both the visual and sensory experiences. In Malawi, ornamented grasses and shrubs are not common.

Outdoor classrooms are designed adjacent to each block, with separate access, allowing for the seamless integration of outdoor and indoor spaces when weather conditions permit. These classrooms are shaded with built-in benches and a blackboard. Art displays, woodworking, and music walls are all integral to education and creative pursuits, providing students with hands-on experiences rooted in their culture and traditions. Sitting logs and benches are placed throughout the outdoors, allowing students to rest or gather to discuss and share their ideas. Ultimately, sensory pathways are designed to facilitate sensory experiences and promote physical activity.

Figure 2 ***Aerial 3D Rendering Showing Buildings and Outdoor Learning Environment***

Limitations

This study has notable limitations. Firstly, due to water scarcity in the region, the design could not incorporate water play in the outdoor learning environment despite its potential educational and sensory benefits. This constraint limits the diversity of activities that could foster holistic learning experiences for students. Secondly, the availability of literature on outdoor learning designs specific to Malawi is minimal. While broader studies from Sub-Saharan Africa and global perspectives were utilized, these may not fully capture Malawi's unique cultural, environmental, and socio-economic dynamics, which could potentially affect the contextual relevance of the recommendations. Lastly, although stakeholder meetings were held with the NGO overseeing the design and construction, the absence of empirical validation or direct engagement with local stakeholders, such as teachers, students, and community members, restricts the depth of practical insights. Addressing these limitations through future research, including field studies and participatory design processes, would enhance the robustness and applicability of the findings.

Conclusion

This study underscores the critical role of OLEs in shaping primary education in Malawi. The proposed design fosters an engaging, student-centered educational experience by integrating cultural relevance, sustainability, and functionality. The central courtyard and radial layout support collaborative learning and environmental stewardship, aligning with local needs and global sustainability goals. However, water scarcity and gaps in region-specific literature on outdoor learning and sustainable school design posed challenges, requiring adaptive approaches and general design principles. Despite these limitations, the study provides a foundational framework for designing schools that strike a balance between tradition and outdoor learning, thereby promoting environmental awareness and academic growth.

Future research involving in-depth stakeholder engagement and empirical validation is recommended to refine these designs and address contextual challenges. This study contributes to the discourse on the design of primary schools, particularly in the least developed countries, with broader implications for similar regions outside Africa.

References

Abdulla, S. (2021). *Culture, play and health: A folk media approach to HIV and AIDS research in rural Malawi* University of Glasgow]. http://theses.gla.ac.uk/82460/

Adams, S., & Savahl, S. (2015). Children's perceptions of the natural environment: a South African perspective. *Children's Geographies*, *13*(2), 196-211. https://doi.org/10.1080/14733285.2013.829659

Boulton, P., & Thomas, A. (2022). How does play in the outdoors afford opportunities for schema development in young children?. *International Journal of Play*, *11*(2), 184-201. https://doi-org.lib-e2.lib.ttu.edu/10.1080/21594937.2022.2069348

Cooper, A. (2015). Nature and the outdoor learning environment: The forgotten resource in early childhood education. *International Journal of Early Childhood Environmental Education*, *3*(1), 85-97. https://eric.ed.gov/?id=EJ1108430

Davis, A. (2017). The Circle of Play: A Cross-Cultural-Study of Teachers' Views of Play Before and After Observing a Community Adventure Play Experience. https://digitalcommons.slc.edu/child_development_etd/19/

Department of Climate Change and Meteorological Services. (2023). Seasonal Climate Outlook. https://www.metmalawi.gov.mw/products/daily-forecast/

Dowdell, K., Gray, T., & Malone, K. (2011). Nature and its influence on children's outdoor play. *Journal of Outdoor and Environmental Education*, *15*, 24-35. https://link.springer.com/article/10.1007/bf03400925

Finnegan, R. (2020). Child play is serious: children's games, verbal art and survival in Africa. In *The Lifework and Legacy of Iona and Peter Opie* (pp. 111-133). Routledge. https://www.taylorfrancis.com/chapters/edit/10.4324/9780429485848-11/child-play-serious-children-games-verbal-art-survival-africa-ruth-finnegan

Galán Díaz, J., Romero-Morte, J., Cascón, Á., Gutiérrez-Bustillo, A. M., Cervigón, P., & Rojo, J. (2024). Different phenological behaviour of native and exotic grasses extends the period of pollen exposure with clinical implications in the Madrid Region, Spain. *Biological Invasions*, *26*(7), 2171-2182. https://link.springer.com/article/10.1007/s10530-024-03303-8

Khan, M., McGeown, S., & Bell, S. (2020). Can an Outdoor Learning Environment Improve Children's Academic Attainment? A Quasi-Experimental Mixed Methods Study in Bangladesh. Environment and Behavior, 52(10), 1079-1104. https://doi-org.lib-e2.lib.ttu.edu/10.1177/0013916519860868

Khan, M., McGeown, S. P., & Islam, M. Z. (2019). 'There is no better way to study science than to collect and analyse data in your own yard': outdoor classrooms and primary school children in Bangladesh. *Children's Geographies*, *17*(2), 217-230. https://doi.org/10.1080/14733285.2018.1490007

Lippman, P. C. (2010). Can the physical environment have an impact on the learning environment?. https://www.oecd-ilibrary.org/can-the-physical-environment-have-an-impact-on-the-learning-environment_5km4g21wpwr1.pdf

Lyoka, P. A. (2007). Questioning the role of children's indigenous games of Africa on development of fundamental movement skills: a preliminary review. *European Early Childhood Education Research Journal*, *15*(3), 343-364. https://doi.org/10.1080/13502930701679312

Malawi Region: Sub-Saharan Africa Income Group: Low Income, National Education Profile 2018 Update. World Bank. (2018) chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.epdc.org/sites/default/file

Malawi economic monitor: Malawi's water and energy challenges can be resolved. (2020, December 15). World Bank. https://www.worldbank.org/en/country/malawi/publication/malawi-economic-monitor-malawis-water-and-energy-challenges-can-be-resolved

Marchant, E., Todd, C., Cooksey, R., Dredge, S., Jones, H., Reynolds, D., Stratton, G., Dwyer, R., Lyons, R., & Brophy, S. (2019). Curriculum-based outdoor learning for children aged 9-11: A qualitative analysis of pupils' and teachers' views. *PloS one*, *14*(5), e0212242. https://doi.org/10.1371/journal.pone.0212242

Marfo, K., & Biersteker, L. (2011). Exploring culture, play, and early childhood education practice in African contexts. Rethinking play and pedagogy in early childhood education: Concepts, contexts and cultures, 73-86. https://www.taylorfrancis.com/chapters/edit/10.4324/9780203839478-11/exploring-culture-play-early-childhood-education-practice-african-contexts

Merewether, J. (2015). Young Children's Perspectives of Outdoor Learning Spaces: What Matters? Australasian Journal of Early Childhood, 40(1), 99-108. https://doi-org.lib-e2.lib.ttu.edu/10.1177/183693911504000113

Mirrahimi, S., Tawil, N. M., Abdullah, N. A. G., Surat, M., & Usman, I. M. S. (2011). Developing conducive sustainable outdoor learning: The impact of natural environment on learning, social and emotional intelligence. Procedia Engineering, 20, 389-396. https://doi.org/10.1016/j.proeng.2011.11.181

Moore, R., Nilda, C., Bieber, B., Konradi, S., Lloyd L., Murphy, J., Rivest, M., Turner, J., Valsing, E. (2014) Outdoor Learning Environment Toolkit: Best Practice Indicators. *Natural Learning Initiative* https://www.depts.ttu.edu/hs/coalition_for_natural_learning/Resources/12_Best_Practice_Indicators.php

Nel, A., Joubert, I., & Hartell, C. (2017). Teachers' perceptions on the design and use of an outdoor learning environment for sensory and motor stimulation. *South African Journal of Childhood Education*, *7*(1), 1-11. https://journals.co.za/doi/abs/10.4102/sajce.v7i1.482

Olsen, H., Thompson, D., Hudson, S., & Kreiss, S. (2010). Creating outdoor early childhood environments: Design strategies and resources. *Design Principles and Practices*, *4*(4), 345. https://scholarworks.uni.edu/facpub/2145/

Shallwani, S., Abubakar, A., & Kachama, M. (2018). The quality of learning and care at community-based early childhood development centers in Malawi. *Global Education Review*, *5*(2), 28-46. https://ger.mercy.edu/index.php/ger/article/view/402

Texas Department of State Health Services. (n.d.). Outdoor learning environment (OLE) Texas. https://www.dshs.texas.gov/obesity-texas/outdoor-learning-environment-ole-texas

United Nations Committee for Development Policy (UN CDP). (2021). *Handbook on the Least Developed Country Category: Inclusion, Graduation and Special Support Measures*. United Nations. https://www.un.org/development/desa/dpad/least-developed-country-category.html

White, R., & Stoecklin, V. (1998). Children's outdoor play & learning environments: Returning to nature. *Early Childhood News*, *10*(2), 24-30. http://www.whitehutchinson.com/children/articles/outdoor.shtm