Physical environment

Background
The summary below presents the research evidence on physical environment in the Arab World.

The Teaching & Learning Toolkit focuses on impact on outcomes for learners; it presents an estimate of the average impact of physical environment on learning progress, based on the synthesis of a large number of quantitative studies from around the world.

This page offers a summary and analysis of individual studies on physical environment in the Arab world. In contrast to the Toolkit it includes studies which do not estimate impact, but instead investigate the implementation of interventions and how they are perceived by school leaders, teachers and students using a range of research methods. This information is valuable for school leaders and teachers interested in finding out more about particular examples of physical environment interventions that have been delivered in the Arab world.

Summary of the research in the Arab World
The physical environment encompasses changing the physical learning environment, either by moving to a new school building; or seeking to improve the design, air quality, noise, light, or temperature of an existing building. To date, there is a dearth of evidence associating the changes of the physical environment with students’ learning outcomes, however, it provided an opportunity to change the expectations and behaviors of students. Furthermore, ensuring that classrooms are adequately ventilated and lit with the right temperature and humidity levels is likely to be the most significant factor affecting learning.

In the Arab world, the sustainable development of school buildings and their locations is one of the challenges facing school administration in the twenty-first century. The design of the school building is until this date limited to classrooms, management and storage without taking into account the creation of a school
environment with the facilities and equipment required for various educational and learning activities and programs (Al Shboul, 2018; Sulaimi et al., 2018).

In Oman for instance, the lack indoor facilities such as gyms in the schools or close to the school environment was identified as a barrier hindering the physical education and limiting the active lifestyle for students (Sulaimi et al., 2018). As such, rethinking the design of school buildings have received much attention in recent research particularly to highlight its significance in the process of developing students, teachers and administrators performance (Al Shboul, 2018). For instance, the exploratory schools in Jordan were designed to include rooms for educational and learning activities, accommodate students with special needs and equipping the classrooms with air conditioning to accommodate high temperatures (Al Shboul, 2018).

Most of the MENA region has an arid climate which requires from school building designers to pay attention to providing proper thermal comfort inside classrooms and ways to save energy. In Jordan, Ali Al-Arja and Awadallah (2016) recommended that both heating and cooling savings issue should be addressed equally in school building design due to its positive effect on the progress of educational process. The use of automatically adjustable shading devices on the main facades of school buildings could be a solution to reduce the heat and lower the energy consumption. Similarly, in Saudi Arabia Alwetaishi and Balabel (2019) and Noor Wali (2018) suggested environmental strategies to enhance the school building performance and achieve Net-Zero energy in hot-arid climates. It is argued that improving the energy saving techniques and achieving the required indoor thermal comfort would be an ideal concept to educate the new generation about the importance of sustainability in addition to providing a high performance and healthy learning environment for students and teachers (Alwetaishi & Balabel, 2019; Noor Wali, 2018).

In another study in Qatar, indoor conditions of classrooms, in particular indoor air quality, was investigated in 16 mechanically ventilated schools during the winter season (Abdel-Salam, 2019). High levels of Particulate Matters (PM) that cause air pollution were found inside these classrooms. Increased students activities and movement, low frequency of cleaning, large number of occupants in small volume
classrooms, and insufficient ventilation were associated with high PM. As such, corrective measures (i.e. adequate ventilation and smaller number of students per class) were suggested to reduce exposure of school children to high indoor levels of these pollutants and improve the indoor air quality.

Similar findings were found in Kuwait when Al-Hubail and Al-Temeemi (2015) monitored the indoor air quality within 46 public secondary schools over a 7-month period during normal school hours. Comparing the collected data to various international standards and guidelines relevant to the indoor environment, indicated high PM10 concentrations and CO2 levels that exceed allowable standards during school hours. Quantitative analysis showed significant correlations between indoor PM10 and CO2 concentrations and some health ailments suffered by the students.

In Algeria, it was noted that the design and construction of the buildings were done in such a way that did not take into account the thermal protection of the building envelope (Amel & Boualem, 2016). Some of the indoor areas would heat up as the temperature rose in the outside environment. The layout of the classrooms and corridors did not take into account the thermal dynamics of the building, especially in an arid climate such as North Africa. The building materials that were used also had poor thermal protective specifications. This could possibly have a negative impact on classroom quality and cause discomfort for students and teachers.

In Egypt, a similar study was done to observe temperature changes in classrooms. It was concluded that temperatures exceeded the comfort zone 60% of the time (Abdallah, 2017). Hence, providing thermal comfort and indoor air quality inside these classrooms is a necessity to increase students’ comfort level, health, which in turn could have a positive impact on their achievement. On another note, the physical environment is an associated factor with teachers’ job satisfaction and has an influence on students’ educational outcomes (Taleb, 2013). In Jordan, teachers (n=264) reported to be highly satisfied with their kindergarten classroom physical environments namely, the availability of an outdoor playground area, the building and facilities, availability of age-appropriate classroom furniture, availability of curriculum and supporting
materials, and the physical area of the classroom. However, they were less satisfied with the playground equipment and availability of educational materials. Not only teachers, but Jordanian school children aged 9–11 years were highly aware of the association of school physical environment with their motivation and enthusiasm to learn (Alnajdawi, 2019).

When defining the ideal school, 40 students from public schools viewed that the ideal school meets their physical, educational and socioemotional welfare needs. Students explained that the ideal school is characterized by a comfortable, attractive and suitable physical environment in the classroom, which all the participants associated with the visual, acoustic, thermal, and spatial elements. As such, providing adequate lighting, comfortable tables and seats, colored walls, and beautiful decorations represented the visual elements where the acoustic element represented by the absence of any internal and external noise. Students underlined the impact of these two elements on their participation and concentration levels. Results also showed that the adequate and suitable heating and ventilation devices in the classrooms affect children’s psychological status, behavior and performance. Lastly, the classroom size and ensuring flexible arrangements for the classrooms’ furniture were stated by student participants to increase the effectiveness of the educational process and promote cooperation among them.
Summary paragraph:
No robust impact evaluations of the effect of physical environment on academic outcomes appear to have been conducted in the Arab world in recent years. The existing studies on physical environments in focus on the design of school buildings and on the quality of classrooms.

Studies in Algeria, Saudi Arabia, Kuwait, Qatar, Egypt and Jordan discussed the alarming health hazards that current indoor air quality and poor ventilation could have on exposed students. As such, providing thermal comfort and indoor air quality inside these classrooms is a necessity to increase students’ comfort level and health, which in turn could have a positive impact on their achievement.

Further research is needed to examine the effect of physical environment on both students and teachers performance. Due to the hot and arid climate in most of the MENA region, research programs in the field of indoor air quality should be proposed and implemented for schools in order to improve the indoor air quality and ventilation and reduce potential health hazards on students.
References


Search terms

Physical environment; school building; classroom setting; classroom building; classroom design; physical learning environment; physical setting; built
environment; school facilities; school design; interior space; educational facilities; space utilization; open plan; school construction; school space.

**Databases searched**

- Academic Search Complete
- ERIC (EBSCO)
- Education Source
- Google scholar
- ProQuest Central
- ProQuest Dissertations
- Web of science