

Built environment



Very low or no impact for low cost, based on very limited evidence.

The built environment is the school building and the physical conditions of the school. Related interventions include moving to a new school building and improving the design, air quality, noise, light, or temperature of an existing building or classroom.

How effective is it?

Overall, changes to the built environment of schools are unlikely to have a direct effect on learning except at the extremes: impact is minimal once an adequate building standard has been achieved.

Moving to a new building could be an effective part of a whole school change that seeks to improve behaviour and establish new norms (similar to introducing or changing **School Uniform**), but there is no evidence that new buildings or particular aspects of architecture directly improve learning. Where a new building is being used as a catalyst for change, there is some evidence supporting co-design, or involving teachers and other staff in the process to help them take responsibility for learning spaces and change their behaviours as they adapt to new settings.

Most individual factors in the physical environment show a relationship with learning only at the extremes. If the noise levels are very high (such as under the flight path of an airport) then there can be a measurable detrimental effect on learning. Very warm (particularly above 30°C) and very humid conditions can cause a loss of concentration and drowsiness. Very low lighting levels can be a barrier to reading and writing but it appears that lighting in schools is usually adequate.

The evidence suggests low internal air quality does have a negative impact on attainment (reducing word recognition by 15% in one study). Low air quality can occur due to the build-up of carbon dioxide in poorly ventilated classrooms.

How secure is the evidence?

The research on the impact of the built environment on learning is generally weak, and is mainly based on correlational studies or drawn as inferences from wider environmental research. There are very few rigorous experimental designs, and this makes it hard to establish causal claims about the impact of physical changes.

Regarding air quality, there is evidence that some English classrooms have higher CO₂ concentrations than the average recommended levels. Given that the link between air quality and academic achievement is better established than other aspects of the physical environment, this may be a worthwhile area for future study.

What are the costs?

It is very difficult to estimate the costs of changes to the built environment as they are usually part of capital spending, rather than a recurrent part of a school budget. A new secondary school costs about £15 million for 1,500 pupils or £10,000 per pupil. However, several generations of pupils are likely to use the building. Improving air quality can be done relatively cheaply with better ventilation, filtration, and the use of dehumidifiers where necessary. Overall, costs are estimated as low.

Built environment: What should I consider?

Before you implement this strategy in your learning environment, consider the following:

1. Most environmental factors have an impact on classrooms only at the extremes.
2. Air quality is likely to be the most significant factor affecting learning, particularly where there is poor ventilation or high levels of dust and other pollutants.
3. High levels of external noise may also have a negative effect on pupils' performance.
4. If you have a new learning environment, it provides an opportunity to change the expectations and behaviour of pupils, but it is unlikely to have a direct impact on learning without other changes. Have you considered how you will take advantage of any new environment to bring about improvements in expectations and behaviours?

Technical Appendix

Definition

This entry covers changes to the built environment such as a move to a new school building or improvements to the design, air quality, noise, light, or temperature of an existing building.

Search Terms: Physical environment; building; physical setting; physical classroom environment; built environment; physical learning environment

Evidence Rating

There are no meta-analyses of interventions on the impact of the built environment on learning. Available systematic reviews do not contain effect size information. Research on this area is mainly based on correlational studies or drawn as inferences from wider environmental research. There are two strands of evidence, one which looks for a link between attainment and poor environmental conditions (negative effects) and one which seeks to identify a link between attainment and good conditions or particular features (positive effects). There are very few rigorous experimental designs or well-matched studies, and this makes it hard to establish causal claims about the impact of physical changes. The correlational evidence tends to be stronger for the negative effect of poor conditions. Overall the evidence is rated as very limited.

Additional Cost Information

It is very difficult to estimate the costs of changes to the built environment as they are usually part of capital spending and a single cost, rather than a recurrent part of a school budget. A new secondary school costs about £15 million for 1,500 pupils or £10,000 per pupil. However, several generations of pupils are likely to use the building. Improving air quality can be done relatively cheaply with better ventilation, filtration and the use of dehumidifiers where necessary. Overall, costs are estimated as low.

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Summary of effects

Single Studies	Effect size	FSM effect size	
Evans, G. W., & Maxwell, L. (1997)	-1.40	-	Reading (Chronic noise)
O'Sullivan, S. (2006)	0.36	-	Reading (Building conditions)
	0.36	-	Maths (Building conditions)
Shield, B. M., & Dockrell, J. E. (2008)	-0.36	-	(External noise on 5-7 year olds)
	-0.41	-	(External noise on 8-11 year olds)
	-0.40	-	(Internal noise on 5-7 year olds)
	-0.43	-	(Internal noise on 8-11 year olds)
Indicative effect size	0.00		

The right hand column provides detail on the specific outcome measures or, if in brackets, details of the intervention or control group.