Sound Proofing

Subject: Physics

Overview:
The loudness of a sound can depend on how far we are away from it. If we find ourselves in a loud environment we could always move away from the source so that it does not effect us; this is not always practical though since you cannot move a house away from a noisy road or a person operating machinery often needs to be next to it e.g. road drill. This is where special materials can come in useful to help Absorb or Reflect the noise.

Aim:
To test a range of different materials to see which help reduce or stop noise from a source reaching the sound sensor.

Equipment required: LogIT Datalogger
Datalogging software, computer,
Constant sound source e.g. electronic keyboard, radio not tuned to a station ('hiss')
A range of different materials to place in front of the sound source or sensor.

Note: A good mix of materials should include soft/hard, light/heavy, thick and thin. This is particularly important when trying to decide which materials to use for different tasks e.g. sound proofing a room or making ear defenders.

Hazards:
Prolonged exposure to high noise levels (e.g. of 90dB or more) can result in permanent damage to your hearing.
If used outside shield sensor from wind and ensure that no liquid contacts any of the datalogging equipment or cables.
Always check your local regulations or the school advisory service such as CLEAPSS or SSERC for guidance on the use of any hazardous material.

Method:
1. Connect the Datalogger to the computer and run the datalogging software. Set up the snapshot facility of the software (if available).
2. Think about which materials to try out. Discuss which materials the students think will block the most sound and which will let the most pass.
3. Place the sound sensor at a fixed distance from the sound source.
4. Turn on the sound source.
5. Press the snapshot button for the software and note down what the first reading was without material.
6. Choose a piece of material and write down its description so that when you come to view the graph you know which point on the graph refers to which piece of material.
7. Place the material between the sound source and sensor at a predefined place.
8. Press the snapshot button for the software.
9. Repeat this for each piece of material to be tested.

Results:
- Did placing material between the sound source and sound sensor change the level?
- Did it matter how close the material was to the source?
- Did hard material effect the sound differently from soft ?
- Was care needed in 'aiming' the sound sensor at the sound source ?

Going further:
- Investigate whether it matters how close the blocking material is placed to the sound source or sensor.
- Which material would be best to sound proof the classroom ?
- Think about noise pollution.
- Study the difference between noise in the school, by roads and in rural areas.
- Monitor and analyse classroom noise for a day.
- Monitor traffic noise - do certain vehicles make more noise than others ? Did the noise level change during the day ?