Acoustic Design and Testing of Schools

Our schedule for today

Morning

- 9.45 – Introduction
- 10.00 – Scope
- 10.30 – Noise
- 11.00 – Room Acoustics
- 11.30 – Break
- 11.50 - Perception-based acoustic design
- 12.00 – Workshop 1
- 12.40 – Lunch

Afternoon

- 1.30 – Internal Sound Insulation
- 2.00 – Design for Special Hearing and Communication Needs (SHCN)
- 2.30 – Commissioning
- 3.00 – Break
- 3.20 - Workshop 2
- 4.00 – Panel Q&A
- 4.30 – End

Welcome

Russell Richardson

ANC Chair

Presenters

Russell Richardson
Adrian James
Ed Clarke
Jack Harvie-Clark
Simone Torresin
Emma Greenland

Acoustic Design and Testing of Schools

Scope

Adrian James

Ed Clarke

Questions that gave rise to this event

- What does good room acoustics in schools look like / sound like ?
- Do BB93 and the associated guidance achieve this ?
- If not, do we need more guidance or regulation on how to achieve good acoustics rather than minimum standards ?
- Should there also be guidance for other types of educational buildings (Colleges, Universities, nurseries etc) ?

Why are acoustics important in schools ?

Results of poor acoustics / high noise levels

- Effect on academic results (OFSTED, LSBU studies)
- Effect on discipline, leading to higher noise levels
- Staff illness (stress and voice problems)
- Pupil illness (stress ?) (Lack of motivation?
- Failure of inclusivity

A special project – Conference centre

- 800-seat multi-purpose hall with flexible layout and excellent acoustics for speech, drama, amplified and unamplified music, with retractable seats for flat floor use
- Up to 20 seminar / break-out rooms
- Audio-visual facilities
- Catering and dining facilities for 800 people
- Light, airy, quiet circulation and exhibition areas
- The acoustics consultant is a welcome and valued member of the design team

An everyday project – £20 m High School

- 800-seat multi-purpose hall with flexible layout and excellent acoustics for speech, drama, amplified and unamplified music, with retractable seats for flat floor use
- Music, drama, recording and audio-visual facilities
- Up to 40 classrooms, suitable for pupils with special needs
- Kitchens and dining facilities for 800 people
- Large sports halls, outdoor play and learning areas
- Light, airy but acoustically controlled circulation areas
- Acoustics consultant is a necessary evil, tolerated only because of BB93 and procured as cheaply as possible

Additional constraints on school projects

- All naturally ventilated and low energy – BREEAM “Very Good” or “Excellent”
- All finishes robust and cheap, or out of reach
- 10 - 20% of users will have temporary hearing problems at any one time
- No contact with the ultimate users of the building
- Often on constrained noisy sites with noise-sensitive neighbours
- Very constrained budgets

Problems with building regulations / BB93

- By definition, they set minimum standards, which are not necessarily the appropriate criteria for a project.
- “Compliance with Building Regulations” is not much of a specification for anything
- “Compliance with BB93” is not a specification for good (or even adequate) acoustics….
- …..but no contractor will pay for better acoustics to exceed the specification
- The criteria set out in BB93 become a substitute for thinking about what acoustic criteria are required in specific cases

What are actually the regulations ?

- *"Each room or other space in a school building shall be designed and constructed in such a way that it has the acoustic conditions and the insulation against disturbance by noise appropriate to its intended use." (Building Reg E4)*
- *The **acoustic conditions** and sound insulation of the schools must be suitable having regard to the nature of the activities which normally take place therein. (*Schools Premises Regulations)

Where does BB93 come in ?

"In the Secretary of State's view the normal way of satisfying this requirement will be to meet the values for sound insulation, reverberation time and internal ambient noise level which are given in Section 1 of BB93 "The Acoustic Design of Schools" produced by DfE."*

Secretary of State when this was written →

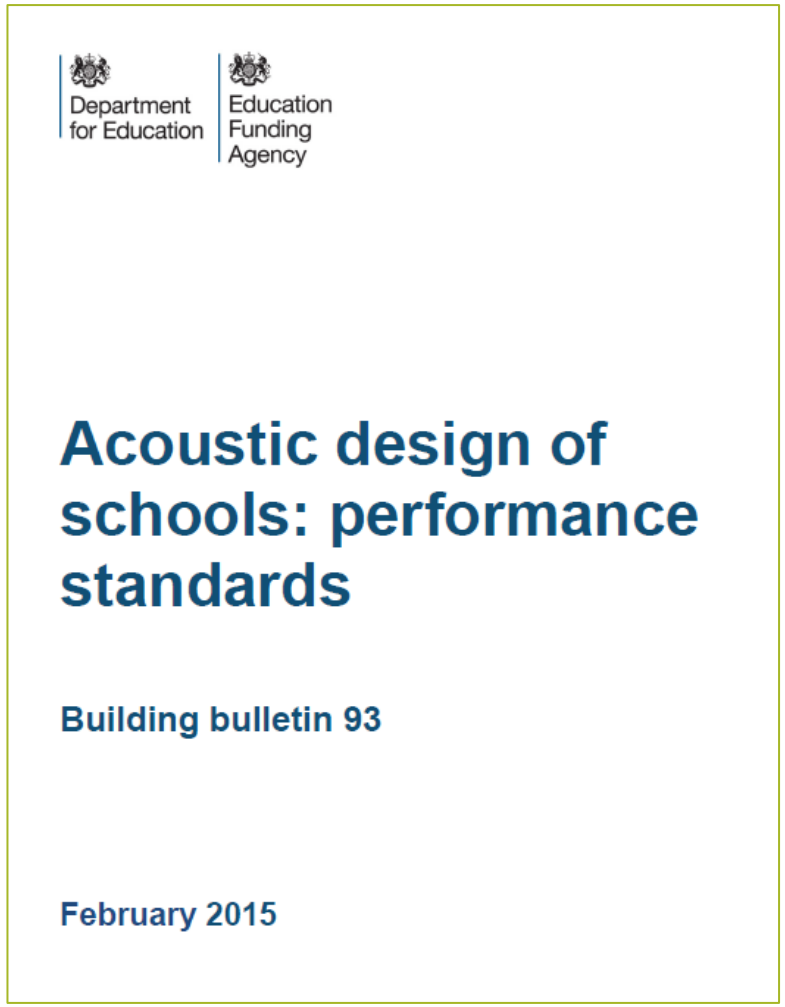
Standards

Set numerical criteria to comply with regulations

Are by definition minimum standards - CATNIP

Are not always set for the “right” reasons

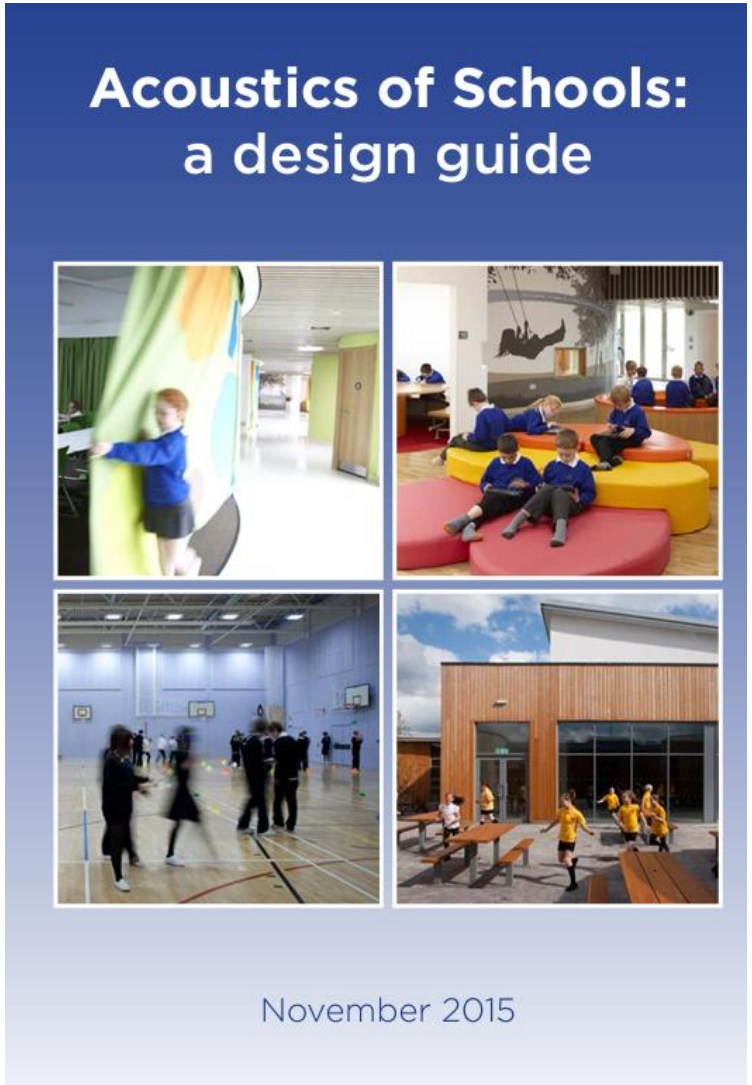
Always lag behind research, experiment and experience.

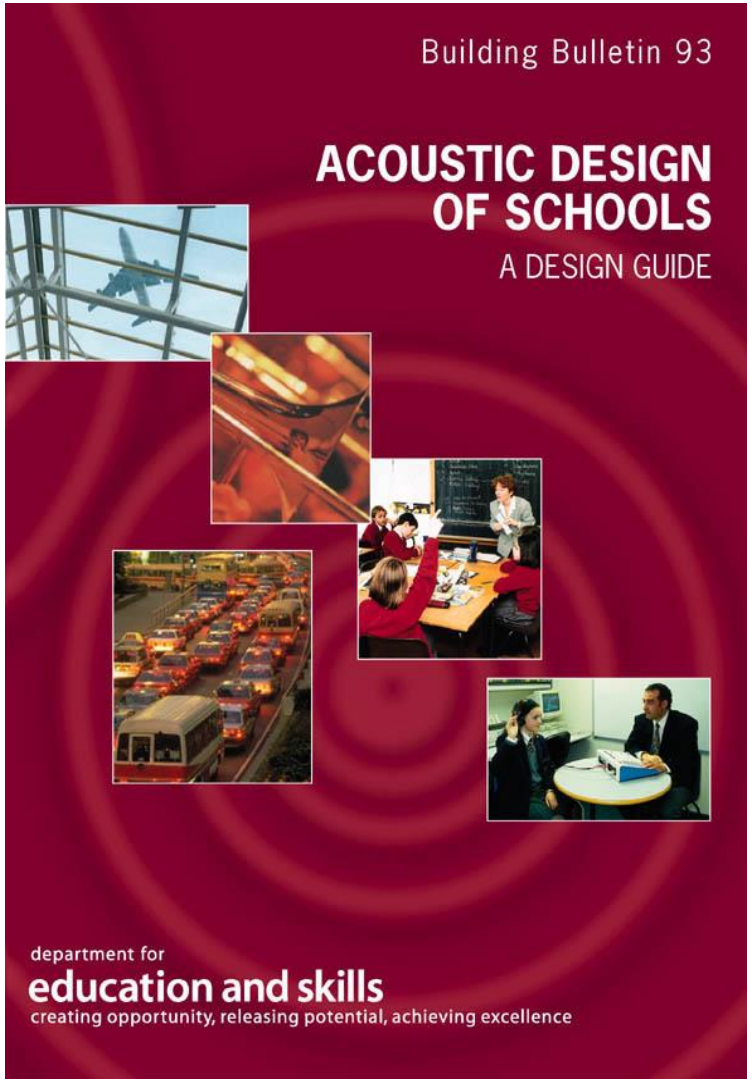


Guidelines

Can also become standards by default…..(e.g. BS8233)

…but if written thoughtfully they can encourage better design than the minimum legal standards.





Argument against numerical criteria in BB93

Building regulations and guidelines for school acoustics can be harmful because :

- They encourage design to minimum standards rather than to good ones
- They are applied to all sorts of education buildings for which they were not intended
- Acousticians will use them without thinking about what they are trying to achieve

THE COUNTER-ARGUMENT

- Without some form of regulation there is no incentive to design for good acoustics
- Remember what school design was like before BB93.

How things have changed……

"BB93 sets some unreasonably high acoustic standards which may not be achievable within school budgets, and could therefore prevent new schools from being built"

(Initial response from IoA Building Acoustics Group to the DfE consultation on BB93, 2003-4)

Where better-than-minimum standards might be needed

Acoustic commissioning

"It is strongly recommended that the client should require acoustic testing to be carried out as part of the building contract, because testing of the completed construction is the best practical means of ensuring that it achieves the design intent".

(BB93, Feb 2015)

Application to other types of educational buildings

What does BB93 cover?

'Schools' includes independent schools, academies, free schools, university technical colleges, sixth-form colleges attached to schools, and nursery/community and adult education spaces within school complexes

Application to other types of educational buildings

What are these ‘other’ niche educational buildings?

- Further Education, including ‘non-school’ 6th form colleges
- Higher Education, universities & colleges
- Nurseries outwith school complexes
- Adult Education outwith school complexes
- Commercial / industrial training facilities
- Military education / training

Application to other types of educational buildings

What does good acoustics look like in these settings?

- perhaps an informed, tailored use of some guidance from BB93 & elsewhere? Which of these might be useful?
  - BS8233 Guidance on sound insulation and noise reduction for buildings
  - HTM 08-01 Health Technical Memorandum
  - HM Courts & Tribunals Service Design Guide
  - BS4142 Methods for rating and assessing industrial and commercial sound

Application to other types of educational buildings - examples





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