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Essex Study: Interim Report

Impact of different acoustic standards in school buildings on teaching and learning

Prepared by D Canning, Hear2Learn Ltd
For NDCS, Essex County Council, Federation of Property Services



Ground Rules

Just two:

- No difficult technical questions
- No hearing jokes!



Background to Essex Study

- Special Educational Needs and Disability Tribunals.
- Parents of hearing impaired children sought out of county places for their children.
- What are the standards?

Building 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.”

Requirement E4 from Part E of Schedule 1 to
The Building Regulations 2000 (as amended). (Building Bulletin 93 p3)

Building Bulletin 93

Three standards:

- Type 1: BB93 regular secondary school classroom performance standard (less than 0.8Tmf)
- Type 2: BB93 classrooms specifically for use by deaf pupils (less than 0.4Tmf)
- Type 3: BATOD* (less than 0.4T 125-4000Hz)

* **B**ritish **A**ssociation of **T**eachers of the **D**eaf

Building Bulletin 93



Building Bulletin 93

- No specific research to inform decision.
- What is Best Value?

Studies show ...

Higher noise levels

= lower academic performance in schools

= increased stress in both teachers and children.

- Shield and Dockrell (2003).

We know that

- For hearing impaired children the acoustic environment can be the most important factor in terms of the possibility of participation within mainstream classes.
- Doubtful?

Downloads: <http://tiny.cc/essexcc2> <http://tiny.cc/essexcc>

“You feel really left out and you feel like you’re sitting in a corner in a lonely classroom so it hurts your feelings quite a bit”

A deaf pupil

What we did

- Conduct experiment in “real” occupied classrooms to:
 - assess the impact on teaching and learning.
 - guide investment in buildings with regard to the acoustic standards.

Methodology

- Four physically similar rooms selected
- Three treatment rooms - fourth a control room throughout the experimental period.
- Each of the three treatment classrooms were treated acoustically to one of the three standards

Methodology

- At intervals of not less than 4 weeks, the rooms were retreated over the weekend to perform as closely to another of the experimental standards as possible.
- The rooms remained visually similar.

Methodology

Pre Treatment



Methodology

Post Treatment



Methodology

- Experiment was double blind
- Staff at the school, pupils, observers and all data analysis was carried out without knowledge of the particular treatment condition.

Methodology

- Triangulation - use more than one approach to the question under investigation to enhance confidence in the findings.
- Quantitative and qualitative research methods.

Methodology

- Approximately 400 children were taught within the four classrooms.
- There were 24 hearing impaired children involved within the study (although not all were taught within the experimental classrooms).

Methodology

- Considerable effort was given to obtaining objective acoustic data.
- More than 120 hours of lessons recorded using high quality audio recordings and 78 hours of detailed acoustic data.
- Being analysed now.

Methodology

- Comprehensive acoustic performance measures of the classrooms taken with regard to the:

Behavioural acoustics (BB93 Section 6).

Physical acoustic measures

Methodology

- Questionnaires completed by:
 - **children** looking at the ease of hearing for each of the communication activities.
 - **teachers** regarding the acoustic environment and the auditory behaviour of a specific deaf child in their class (where possible).

Methodology

- Teachers were interviewed about their experience by an external consultant who **had no knowledge** of the rooms and was independent of the school and county council.

Methodology

- A range of hearing assessments using speech material were carried out with deaf and matched hearing children- **matched in terms of academic ability and performance.**

Methodology

Four types of data were collected from the children:

- **Questionnaire data** – using the LIFE UK questionnaire at each stage of the trial.
- **Speech discrimination** data was obtained in each environment using commercially available and specially developed computerized speech tests.
- **Acoustic data** of communication activities recorded at the ear level of children within occupied classes.
- **Interview data** with selected children.

Methodology

- Speech discrimination data:
- The staff at the school matched hearing-impaired children academically and socially with hearing children.
- Children took part in a number of speech discrimination and other listening tasks in the various classroom settings.

Findings

- Normally hearing children are able to tolerate a high level of competing noise before their performance decreases.

Findings

- Hearing-impaired children at the school vary considerably in their ability to hear when there is competing noise.
- Consistent with the literature - hearing impaired children normally have problems with hearing in noise, even with the best technology available.
- Group working/pass the microphone!

Findings

- Difficult to predict how an individual child might perform
- Look at hearing impaired children individually rather than as a group.

Findings

- Thirteen class teachers and Specialist Communication Support Workers were involved in the study although the majority of classes included were taught by just 5 teachers.

Findings

- Overall impression from the data is overwhelming positive improvement in working conditions for both staff and pupils.

Findings

- Even the most experienced of teachers found the changes a big improvement.
- Less experienced staff felt big reduction in stress levels.

Findings

Behaviour improvements (noted by teachers):

Findings

Better at following class directions.

Findings

More on task behaviour.

Findings

Less repair behaviour
(asking for clarification or repetition).

Findings

The children can hear what I am saying,
before they could not hear me

Findings

Money well spent.

'I love it' fantastic impact with low ability children's behaviour improved.

Findings

Fairer as the hearing-impaired children are now equal to the other children.

Findings

“I feel strongly; can’t wait for this standard for all rooms, all schools, would be amazing.”

(Higher standard of classroom treatment).

Findings

“I am able to do group work now, whereas before I would not take that risk”.

Findings

“If everyone was being noisy I couldn’t concentrate. In this new classroom I find it a lot better, a lot less noisy and it gives me a lot of confidence to work as a group”

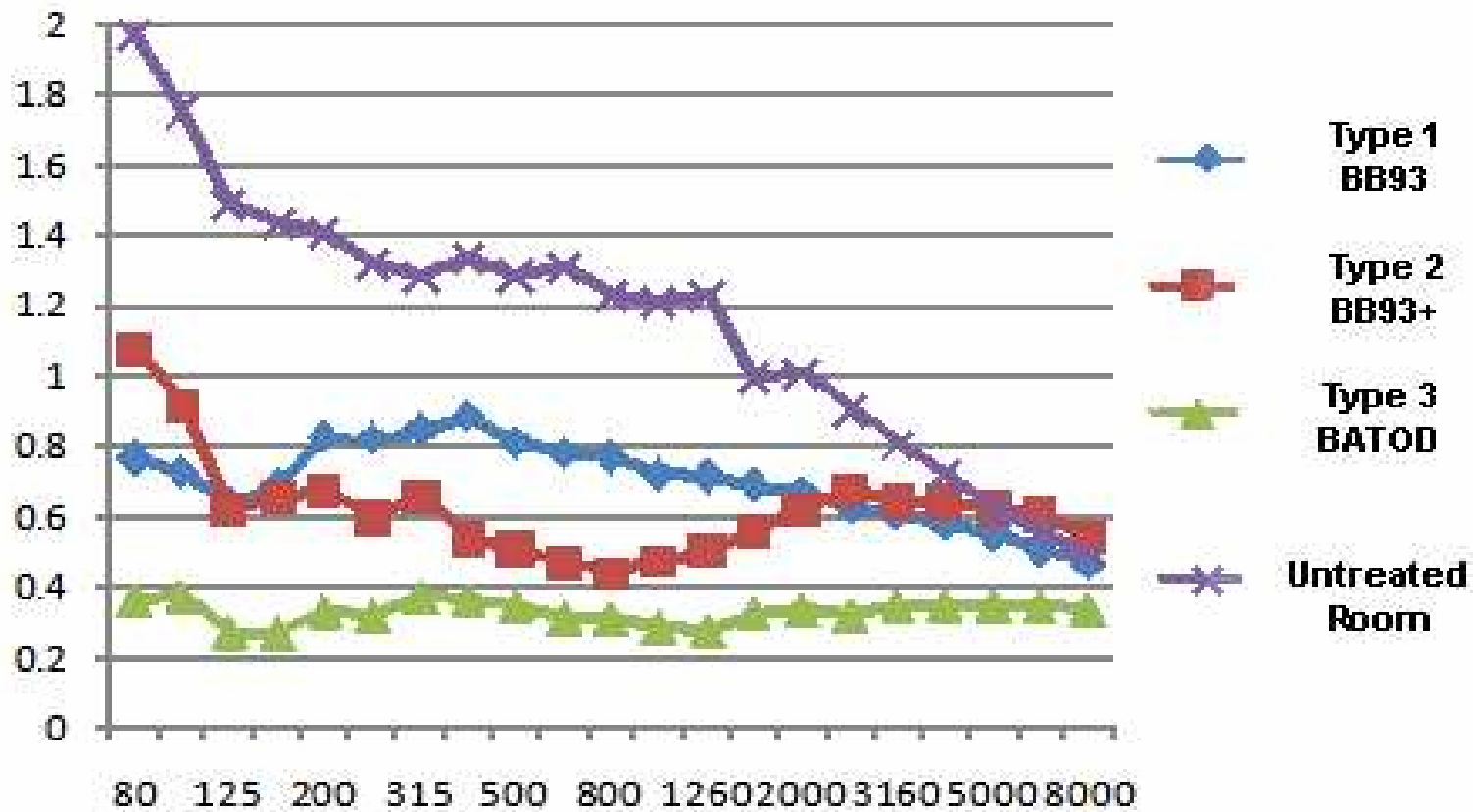
deaf pupil

Findings

- It has been possible to see that increasing the sound absorbency within a classroom **reduces the sound levels more than would be expected from calculations alone.**

(occurred without staff being aware of the acoustic performance of the rooms at the various stages of the trial).

Findings



Cost

£

Ceiling Specification's

- Type 1 Plastic faced plasterboard tile in white exposed T bar system;
- Type 2 A general high performance absorber with a textured surface;
- Type 3 A high performance acoustic absorber with textured surface with primed edges. To improve absorption in the low frequency range, Master Extra Bass panels are installed on top of the ceiling.

Lighting Specification

- For a typical 8M x 7M (56sqM) class base with 350lux and good uniformity. Example fitting is a white gull wing with central louvre;
- Installation consists of 9 No. 600 x 600 recessed luminaires with 40watt lamp High Frequency control gear. Emergency control gear in 2 fittings;
- Install circuit for luminaires using PVC/PVC cables clipped within ceiling void switched in rows with interactive board luminaire separately switched.

Costs

Room Type	Small refurbishment		Small New School	
	2 class bases (approx 112M ²)		(approx 1000M ²)	
	Ceiling	Lighting	Ceiling	Lighting
1	£19.50/M ²	£210/M ²	£15.00/M ²	£149/M ²
2	£29.00/M ²	£210/M ²	£22.50/M ²	£149/M ²
3	£53.00/M ²	£210/M ²	£44.50/M ²	£149/M ²

Costs

For a new build classroom (56m²):

Type 2 **£420** more than type 1

Type 3 **£1652** more than type 1

In Summary

- Good acoustics can level the playing field between the deaf and hearing children
- Teachers found the acoustically treated classrooms better and less stressful teaching environments
- Teachers found that **all** pupil's behaviour improved in the acoustically treated classrooms
- Type 2 classrooms are only marginally more expensive than type 1

Thank you



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