Preliminary Findings From a Survey of Student’s Perception of Their Acoustic Environment in English Secondary Schools

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Aims

• Survey students’ perception of school’s acoustic environment
• Relate findings to objective measures
• Identify good and bad classrooms/spaces for hearing?
• Common sounds in school?
• Annoyance – when and in response to what?
• Effects of unwanted sound/poor acoustics on behaviour/concentration?
• Differential effects on students with hearing problems, English as a second language, learning support.
• Inform design of cognitive tasks
Previous Research with Questionnaires

• Dockrell and Shield 2004
  – Primary school children able to discriminate between good and bad listening environments
  – Correlates well with acoustical measures

• Alstolfi and Pellerey 2006
  – Secondary school students able to identify the sounds they heard at school and the effect it had on them - *Decrease in concentration*

• Kennedy, Hodgson, Edgett and Lamb 2006
  – University student reliably identified the sounds that interfered with learning
Development of the Questionnaire

• Interviews
  – Special Educational Needs Coordinators (SENCOs)
  – Teachers of the Deaf

• Rating Scales

• Open Questions
Categories of Questions

• Personal information
  – school year
  – hearing problems/hearing aid use
  – learning support received
  – EAL

• School spaces and how easy or difficult it is to hear in these spaces

• Common sound sources/events
  – Talking; Sounds from other classrooms; Corridors; Teachers; Loudspeakers
  – Frequency and Annoyance

• Activities and Annoyance
  – Reading
  – Writing
  – Working With Numbers
Categories of Questions

• Situations in which it is difficult to hear the teacher
  – When the teacher has their back to me; When other students in the class are talking

• The effects of noise and the consequences of not being able to hear
  – ‘I leave the lesson feeling more tired…’, ‘I ask the teacher to repeat what they have just said’.

• Open questions
  – The subject and classroom/space in which it is hardest to hear
  – The subject and classroom/space in which it is easiest to hear
  – Reasons why

• Positive or negative feelings regarding their school sound environment
Pilot

- Pen and Paper
- 24 secondary students
  - Range of abilities and ages
  - 8 children reported hearing problems
- Pilot showed questions were valid
- Readable by lowest ability children
- Small modifications made
- Online Questionnaire
- SurveyMonkey.Com
**Identifying a Sound Environment for Secondary Schools.**

SurveyMonkey.com

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**Please rate how easy or hard it is to hear your teacher in these places around your school.**

*If you don't have this kind of space in your school or you don't know it, click 'Don't have/don't know this space'*

<table>
<thead>
<tr>
<th></th>
<th>Always easy to hear</th>
<th>Easy to hear most of the time</th>
<th>Sometimes easy, sometimes hard to hear</th>
<th>Hard to hear most of the time</th>
<th>Always hard to hear</th>
<th>Don't have/don't know space</th>
</tr>
</thead>
<tbody>
<tr>
<td>My tutor/form room</td>
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<td>The art room/s</td>
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<td>The assembly hall</td>
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<td>The corridors</td>
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<td>The Design and Technology room/s</td>
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<td>The dining area/canteen</td>
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<td>The drama studio</td>
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<td>The ICT room/s</td>
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<tr>
<td>The language classroom/s</td>
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<tr>
<td>The music room/s</td>
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<tr>
<td>The science room/s</td>
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<tr>
<td>The sports hall</td>
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</tbody>
</table>

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2/15
Can you give the room number and/or name of the classroom in which it is hardest to hear?

* Why is it hardest to hear in this subject? You can choose more than one of these reasons

- [ ] The teacher is too far away
- [ ] The room is echoey
- [ ] The teacher does not speak loudly and/or clearly enough
- [ ] The students make too much noise by talking to each other
- [ ] There is too much noise from outside the classroom
- [ ] There is too much noise from inside the classroom (such as machines, equipment)
- [ ] The teacher cannot get the class to be quiet
- [ ] The sound is too muffled
- [ ] Other reason - please say what in the box below

Other reason

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Exploratory Factor Analysis

- To establish validity and reliability of categories and questions

- **Participants**
- 1064 students
- School 1 = 803; School 2 = 261
- 540 females and 524 males
- four age groups:
  - 11-12 (n = 351, 28%)
  - 12-13-years (n = 191, 15%)
  - 13-14-years (n = 316, 25%)
  - 14- to 16 (n = 206, 16%)
- 59 - Hearing problems
- 64 - English was not their first language
- 148 - Learning support at school
PCA Variance Explained

- Ease of Hearing in School Spaces (28.42)
- Annoyance- School Sounds (7.31)
- Activities & Annoyance (5.72)
- Classroom Impact (3.95)
- Sounds heard – School (3.9)
- Annoyance – machines
- Situations when hard to hear
- Sounds heard - machines
- Concentration and fatigue
- Classroom management
- Quiet activity
- Fans, computers
- Other

Identifying a Sound Environment for Secondary Schools. www1.lsbu.ac.uk/ISESS
### 4 Retained Components

<table>
<thead>
<tr>
<th>Factor</th>
<th>Example</th>
<th>No. Of Items</th>
<th>Variance Explained</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ease of Hearing in School Spaces</strong></td>
<td>The Science Room/s, The ICT Room/s, The Assembly Hall</td>
<td>12</td>
<td>28.42</td>
<td>.92</td>
</tr>
<tr>
<td><strong>Annoyance to Sounds in School</strong></td>
<td>Students talking loudly in the classroom; Students in the corridor; Sound coming through a loudspeaker</td>
<td>9</td>
<td>7.31</td>
<td>.89</td>
</tr>
<tr>
<td><strong>Activities &amp; Annoyance</strong></td>
<td>Writing; Reading; Working with Numbers; Listening to my teacher; Doing a test or exam</td>
<td>8</td>
<td>5.72</td>
<td>.91</td>
</tr>
<tr>
<td><strong>Classroom Impact</strong></td>
<td>I ask the teacher to repeat what they have just said because I didn’t hear the first time. I ask another student what the teacher has just said because I didn’t hear the first time. I find it hard to tell which direction a sound is coming from</td>
<td>8</td>
<td>3.95</td>
<td>.91</td>
</tr>
</tbody>
</table>
Paired Comparisons - Hearing Problems

- All differences significant, $p<.01$
- All effect sizes large, especially on classroom impact
- $r=.48, r=.48, r=.39, r=.62$
Learning Support

- Significant differences on ‘Annoyance at school sounds’ and ‘Classroom Impact’,
- P < .01
- Medium effect sizes:
- $r = .22, .28$

Do you receive any learning support at school?

- Learning support
- No learning support

Factor
- Ease
- Annoyschool
- Activities
- Impact

Mean rating (1-5)

(Error Bars: 95% CI)
English as a Second Language

- Significant differences on ‘Annoyance at school sounds’, ‘Activities when noise is annoying’ and ‘Classroom impact’,
- $P < .01$
- $r = .47, .40, .51$
• Significant differences on ‘Ease of hearing’, ‘Annoyance at school sounds’, ‘Activities when noise is annoying’

• $P < .01$

• $r = .47, .40, .51$
Age 11-12 more annoyed by sounds at school, $p < .05$
Summary/Conclusions

• Reliable and Valid Instrument
• Reveal different experiences of HI, LS etc
• Correlate findings of questionnaire with objective measurements
• Valuable for gauging student opinions
• Useful for prioritizing spaces for improvement, comparing treated/untreated spaces, old/new buildings etc.