In secondary school teachers with functional dysphonia, is there a significant improvement in voice impairment when sound amplification systems are used in classrooms compared to normal conditions?

**Rationale**

Functional dysphonia is the result of voice misuse and/or over abuse. Teachers are the largest occupational group to seek help for voice disorders due to the vocal demand of the job with between 20% and 80% experiencing voice symptoms. Risk factors include; background noise, poor room acoustics, long speaking distances, poor quality of air, poor working posture and vocal loading (time and intensity). Despite functional dysphonia having a large impact on teachers occupational capacity, attendance rates to voice therapy has been noted to be poor. Easy therapy intervention is required to reduce vocal demands.

### Critical Analysis

#### Systematic Reviews: PRISMA criteria used to assess quality.

- **Ruoatsalainen et al, (2010)** 1 in level of evidence (LoE); high quality study pertaining to all 27 points of the PRISMA criteria (except 16 & 25 as not applicable)
- **Ziegler et al, (2010)** 2a LoE; limited information provided in concordance with PRISMA criteria. Using ‘Method’ as an example; no mention of protocol or registration, does discuss eligibility criteria but only in terms of report characteristics (years considered, language), not specific study characteristics and no rationale given, only one database (PubMed) searched, no method of data extraction given and no mention of control for bias. The study did not provide evidence for my question, however relevant references were utilised.

### Studies Included (Cochrane Reporting Framework)

<table>
<thead>
<tr>
<th>Author</th>
<th>Method</th>
<th>Participants</th>
<th>Interventions</th>
<th>Outcomes</th>
<th>Notes</th>
<th>Allocation</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roy et al, (2003)</td>
<td>RCT</td>
<td>87 full time elementary and secondary teachers + voice problems</td>
<td>Intervention; course on professional use of voice Control Group of no intervention</td>
<td>VHI, Voice Severity Rating Scale Post-treatment Questionnaire</td>
<td>no drop out rates for VA, USA study</td>
<td>No use of blinding (difficult in intervention studies)</td>
<td>was rejected</td>
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<tr>
<td>Bovo et al, (2007)</td>
<td>RCT</td>
<td>64 full time female teachers (kindergarten or elementary level of ed)</td>
<td>Randomly assigned to Voice Amplification Resonant Voice Therapy Respiratory muscle training</td>
<td>Videolaryngostroboscopy Speech variables, Questionnaires</td>
<td>3 and 12 month follow up, no attrition bias considered. USA</td>
<td>No use of blinding (difficult in intervention studies)</td>
<td></td>
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<tr>
<td>Roy et al, (2002)</td>
<td>RCT</td>
<td>50 full time elementary and secondary teachers + voice problems</td>
<td>Random assigned; Vocal Hygiene Voice Amplification No Treatment</td>
<td>VHI, Voice Severity Rating Scale Teacher and student Questionnaires</td>
<td>Sig lowering in voice disorder by VA. VA higher levels of compliance. USA</td>
<td>No use of blinding (difficult in intervention studies)</td>
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<tr>
<td>Jonsdottir et al, (2002)</td>
<td>RCT</td>
<td>33 teachers and (varying levels of ed) 791 students</td>
<td>Use of electric sound amplification for at least one week</td>
<td></td>
<td>No baseline measures obtained. Qualitative data, measurement bias considered. Iceland</td>
<td>No use of blinding (difficult in intervention studies)</td>
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<tr>
<td>Jonsdottir et al, (2001)</td>
<td>RCT</td>
<td>5 teachers (varying levels of ed)</td>
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</table>

**References:**

3. Using ‘Method’ as an example; no mention of protocol or registration, does discuss eligibility criteria but only in terms of report characteristics (years considered, language), not specific study characteristics and no rationale given, only one database (PubMed) searched, no method of data extraction given and no mention of control for bias. The study did not provide evidence for my question, however relevant references were utilised.
4. Ziegler et al, (2010) 2a LoE; limited information provided in concordance with PRISMA criteria. Using ‘Method’ as an example; no mention of protocol or registration, does discuss eligibility criteria but only in terms of report characteristics (years considered, language), not specific study characteristics and no rationale given, only one database (PubMed) searched, no method of data extraction given and no mention of control for bias. The study did not provide evidence for my question, however relevant references were utilised.
5. Despite functional dysphonia having a large impact on teachers occupational capacity, attendance rates to voice therapy has been noted to be poor. Easy therapy intervention is required to reduce vocal demands.
6. Critical Analysis: One study was rejected after critical analysis on the basis of weak methodology with small sample size, no randomisation, no matched group and conditions/equipment differed between groups. From the remaining studies accepted (CONSORT checklist for RCTs) small sample size was still an issue and the RCTs did not state method of randomisation. Only one study completed a post-therapy follow up, limiting evaluation of long term effects. An additional study was directly linked to the current question however, it was unobtainable (author contacted). This study was not used in SRs above. Established from the abstract: a cohort study with small sample size, only acoustic values and questionnaire outcomes (no voice grading scales). Clear that the current question is looking at different specifics of voice intervention.
7. Conclusions: Despite issues raised in critical analysis, the studies provide up to date, strong levels of evidence, proving that voice impairments in teaching population can be positively influenced by amplification due to reducing vocal load. Amplification also resulted in reduced body fatigue, facilitated student listening and concentration, and had low drop-out rates suggesting effortless therapy technique.
8. Future Research: Further investigation is needed including large scale longitudinal studies analysing use of voice amplification within secondary schools within the UK, which may aid greater understanding of whether amplification effects vocal intensity, duration or both, in more detail. Effectiveness of outcome measures for functional dysphonia would be beneficial for future study evaluations. Analysis of voice amplification between genders to establish whether studies should be controlled for gender.