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TRAINING VOICES FOR THE SCHOOL ENVIRONMENT

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1.INTRODUCTION

Voice is a vital working tool for the teacher. A flexible, easily projected voice enables the teacher to stimulate interest, manage the challenges of pupils, the space and the background noise while involved in the teaching and learning process.

The "Guidelines for Environmental Design in Schools" (1) indicate that designers need to take an holistic approach to the acoustics, lighting, ventilation, heating and thermal performance of the school.

In contrast to the detailed consideration designers give to hearing, the space, noise, reverberation time, listening to music, and hearing impaired, no professional consideration is given to the care and use of the teacher's voice. The Department for Education and Employment (DfEE) acknowledged, in a letter to the Voice Care Network, that teachers are expected to have a wide range of communication skills but it is up to the training institutions to decide how they should be achieved. "The Department has no powers to intervene." (2)

Voice training for actors began a central approach in Britain early in the century with Elsie Fogarty, who founded the Central School of Speech and Drama, Gwynneth Thurburn (3) the principal who followed her, and developed by Cicely Berry (4) of the Royal Shakespeare Theatre. Voice for teachers has been adapted from actors' training to support teachers' voice and communication skills. The work is enhanced by advice on voice care by speech and language therapists.

Facts gathered indicate the advantages of including practical voice care and voice development in Initial Teacher Training. The work at the moment is regularly introduced in over twenty five ITT establishments sometimes with follow-up. (5)

2. WHY THE WORK BEGAN.

Ten years ago speech and language therapists (SLT) reported that teachers were particularly prone to suffer damage to their voices and they had a high percentage of teachers on their clinical caseloads, most of whom did not understand how their voices functioned, and some had to leave the profession. In a Midland pilot survey in 1989, up to 30% of the patients in some voice clinics were teachers. (6) The numbers gathered from clinic returns for June 1992 (41 clinics) and January 1993 (54 clinics) were 262 teachers, June 1992, and 279, January 1993. Absence from school involved medical costs and sometimes a supply teacher at £100 per day. The teachers were receiving therapy, awaiting treatment, or on review. The total number of clinics in UK was unknown. The findings were related to the population figures, with the inference that one in ten long serving teachers might become a voice patient at some time in their career (6). Most Teachers attending exploratory voice workshops in 1991/2 had minor voice problems which could be relieved. At two workshops six and seven teachers were recommended to seek medical help.(7)

A Pilot survey in conventional primary school classrooms of noise levels and student teachers' voices (8) showed the effect on voice level of the pupils' noise. In acoustic recordings, made simultaneously, females tended to increase volume and pitch of voice, particularly towards the end of a lesson, which could be counter-productive, the voices of the male teacher and student had more contrast with the pupils and their voices were kept level.

A concerted initiative by the Voice Care Network persuaded ITT directors to hold Voice Awareness Workshops. The findings below come from questionnaires filled by PGCE students at three universities between 1994 and 1997.The Sessions were for two hours.

Response	Number	Percentage
students completing questionnaires	630	
affected by painful throat, hoarseness, voice loss	311	49
number considering follow up useful	440	70
number providing positive feedback	441	71

Fig.i, Feedback from PGCE students after one two-hour Voice Awareness Workshop.

Written comments included : "...excellent to hear how voice actually works"... and they..."...didn't realise how important and valuable the voice is in teaching". (9) Facts reported by other VCN tutors produce similar figures.

3. THE DEVELOPMENT OF VOICE.

Every voice is unique. We inherit physical and other characteristics from our forbears. How we respond to the experiences of life make us the people we are. Our voices reflect this. Figure ii demonstrates the factors that can affect our voices. The ideas are drawn from various sources and most people will agree with the areas.

Fig ii, factors affecting voice

The stimulus for voice comes directly from the brain, causing the intricate muscles of the larynx to close the passage from the air system, which is their prime job. However, the breath forces the vocal folds apart and they spring back repeatedly interrupting the airflow about 100 times a second for men and 200 times a second for women. The vibrations created are heard as voice which has been modified in passing through the spaces in the vocal tract, above the larynx, in particular, in the throat, nose and mouth. The muscles controlling the organs of speech in the mouth move to create the sounds in words for talking. (11)

Muscular systems within the body are involved in the production of voice. Voice becomes part of ourselves and to a great extent it is taken it for granted. Teaching puts heavy professional demands on voice. Teaching is a stressful job (10) and stress affects voice. Activities in voice work help reduce stress.

4. WHAT DOES VOICE WORK INVOLVE?

The figure below summarises the main areas of work showing how the interrelated elements come together. It is firmly based on practical work used in training actors for many decades.

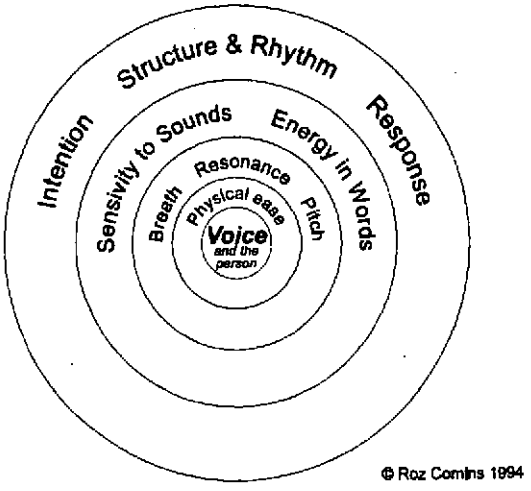

Fig iii The Wave Diagram

The diagram takes its name from sound waves radiating from their source. The practical work begins with the person in the centre and develops through the inner waves to the periphery, from the control of the voice to effective oral communication, from the medium to the message. Skills developed in one wave support the others and learning can begin on the outside with existing skills. The speaker's intentions must be involved. As voice is bound up in the person, work on voice and the self overlap.

Voice Awareness develops through the following stages:

awareness
understanding
experience
practice and, finally, skill

Voice training has similarities with sports training where coach and physiotherapist support practical work. Both activities aim to increase physical stamina, mental and physical control. Voice is personal, so student teachers are involved in assessing their needs and identifying areas that need strengthening.
Whenever possible VCN tutors work in pairs. The voice teachers (VTs), are experienced in voice development and oral skills, the speech and language therapists (SLTs) have specialist experience with voice patients, giving advice on voice care and the prevention of problems.

SLTs emphasise both the importance of drinking water to lubricate the larynx, so that the outer mucosal layer of the vocal folds in the larynx keep moist, and the importance of taking care when suffering from laryngitis. Continuing to talk while suffering from laryngitis can cause long term problems, and whispering puts strain on the vocal folds. (11)

How the session is delivered is crucial. The approach is positive, sensitive and relevant. VCN tutors attend Interactive Study Meetings to share skills, exchange ideas stimulated by running workshops. The content and organisation of sessions are discussed in order to make maximum use of very limited time. A lecture with participation may be a short as one or two hours. After school placements have begun is a suitable time for sessions, when students are aware of the demands on voice. Key features in establishing voice control are physical ease of posture, ability to stand still, to pause and speak slowly and concisely. (Most students speak quickly).

A detailed description of workshops is not appropriate here, but facts can be stated.

5. FACTS GATHERED AFTER VOICE SESSIONS

Comments in the feedback questionnaires from students list useful activities. These items are regularly included:

easy balance of posture,
relaxation and breathing
how to care for voice,
how voice works,
awareness of vibration of the voice in body, chest, temples and "mask",
each voice has its own pitch and range of pitch,
opening the jaw can add carrying power to voice,
balancing the resonance near the front to the mouth increases vocal flexibility,
mental focus on precise image and thought adds vitality to voice,
sensitivity to sounds in words, the muscularity in words,
awareness of rhythm of phrases in text.

Further items were found useful in considering the class:

the effect of the working space on their voice, another resonator,
the affect of tone of voice and flexibility of voice on their listeners,
the need to observe and manage the mood and feeling of the class,
the different roles teachers play, especially in managing disruptive pupils

Applying one of these factors can support a student teacher. They apply others as they become more confident. We ensure ways to solve problems have been introduced. Anecdotal evidence from students, in the past, has included being told to: "pitch your voice down", "get more variety into your voice", but no practical explanation of how it could be done. A VCN tutor had to explain to a almost voiceless teacher, who, by supervising every sports day and taking on every vocally demanding task had misused and overused her voice. "Why was I not told about this?" she asked.

At one university students can join a six week Voice Skills follow-up. The courses are full. Voice development and personal coaching is possible. Exercising voice, practical reading aloud and practising roles a teacher needs to project is welcome exercise. Short videos of their teaching played back is rated highly useful. (9)

The VCN so far, has no funding or facilities to undertake a major survey of teachers' voices. We do not know if the number of women compared with men have similar problems. Students of both sexes make similar response on questionnaires. Male and female teachers attend workshops in school. There are a greater number of female teachers amongst the 450,000 in UK, so the proportion of those with voice problems will be higher. Women may in general have lighter voices, but a light well-projected voice will carry easily. At a Teachers' Union Conference last July I heard of a male probationary teacher forcing the volume of voice in Open Plan as a result of instinctive response to the sounds of the class working in the next "stall". The school was a design prototype for the area. Open Plan is often criticised at our sessions by teachers who report on the problems experienced when three different lessons are being delivered to sets of thirty pupils or more, at the same time, in close proximity. Voice control and management needs to be efficient to prevent distraction. Problems are enhanced when a large proportion of primary pupils have intermittent ear infection and cannot hear easily according to work by David Canning, City University.

6. BENEFITS OF VOICE TRAINING

Evidence of the benefits of voce training exist in hundreds of questionnaires collected, but not fully processed. But Morton, (SLT) of Belfast City Hospital, recorded the following after two Summer Schools for teachers held for the Belfast Regional Training Unit gave 100% agreement to the place of voice in teacher training. (12) After one term those who attended were approached for further evaluation:

93% indicated that voice was satisfactory (pre-course 25%)
100 % had practised some of the vocal techniques - increased fluid intake, reduced throat clearing and reduced shouting were considered to be the best techniques.
64% felt they would like the opportunities to further develop practical voice skills, as they regarded voice care as an on-going process.

Forty Six Post-Experience PGCE students attended one introductory session. These responses to questionnaires were filled after one or two years' teaching experience: (8)

100% were in favour of voice training in ITT
78% had applied techniques in teaching
89% were in favour of voice workshop for School Inset Days
52% found their voices stood up well to teaching
34% found their voices stood up adequately
4% only managed their voices with difficulty - they taught maths and modern languages to pupils in the 12 - 16 age group

7. WHY A TEACHER'S VOICE IS VITAL.

Spoken words depend on voice just as the written word needs pen, pencil and paper. Remove voice and words cannot be sounded. Ineffective voice and oral skills reduce efficiency of the teaching and learning process. Jonsdottir in Iceland is testing the efficiency of microphone equipment for teachers recovering from therapy. She is collecting records of the benefits pupils experience, and has observed a smaller number of pupils yawning when the equipment is turned on! (13)

Qualified Teacher Status (DfEE) requires teachers to: establish a purposeful working atmosphere and create positive and productive relationships: stimulate curiosity and communicate enthusiasm: make clear presentation and instruction, with well-paced explanations: carry out effective questioning and encourage pupils to take part. (14)

A senior lecturer wrote the following in a letter to the TTA:

> "Most of us are not aware that many professions (e.g. acting, the police service, business people) pay for this training: whereas in teaching, the profession that needs it most has this ramshackle, unprofessional approach to crowd control, class management ...they are unlikely to address the...important issues ...unless someone informs them about the professional training available...It is generic, and is essential for all students..." (15)

Initial Teacher Training courses need to include a professional introduction to voice and to provide voice coaching when needed. The Voice Care Network is now a registered charity. We share ideas and believe the creation of new knowledge is most likely to occur when people bring different ideas and skills together purposefully and interactively. The Network is convinced that effective use of voice is a vital element in children's education and in classroom management.

8. REFERENCES:

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THE SOUND INSULATION OF SCHOOLS AROUND AN AIRPORT

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1. NOISE CONTROL AT LONDON CITY AIRPORT

In 1983, Bickerdike Allen Partners (BAP) were retained to prepare and present noise evidence at a Public Inquiry into the development of a new airport in the Royal Docks of London. Following a vigorously disputed hearing, permission was granted and BAP have been retained since that time to assist in resolving consequent noise issues. This has involved presenting evidence at a second Public Inquiry into the development of the airport to handle turbo-fan aircraft and the development of a noise control scheme. Recently, a further permission has been obtained, following submission of a detailed environmental statement. BAP's current work includes development of a noise control scheme which is integrated with a radar track-keeping system and development of sound insulation schemes for domestic properties and schools in the area. This paper describes the work undertaken at Drew Primary School.

2. DREW PRIMARY SCHOOL

Drew Primary School is very close to the airport, to the south of the runway, which has an east-west orientation. The school is situated in the corner of the L-shaped airport building. The terminal building is immediately to the east and the arrival and departure gates building is immediately to the north, with only the airport access road between. The building is well screened from ground movements by the airport buildings, but is subject to noise from aircraft in flight, especially when aircraft take off to the west, when they suddenly appear above the buildings. The school is situated in the 63 dB $L_{Aeq,16h}$ contour, based on movements permitted under the latest planning permission.

The building is of traditional construction with red-brick walls and single-glazed windows in timber frames. There are three main storeys, each floor being arranged with a central hall and perimeter classrooms. At third floor level, there is an art room, which is accessed via a flat roof.

3. EARLY SOUND INSULATION WORK AT DREW PRIMARY SCHOOL

In 1989, under the terms of a Section 52 Agreement, London City Airport carried out a scheme of sound insulation works at Drew Primary School. The requirement of this scheme was that the existing glazing, modified by the introduction of secondary glazing, was to achieve a minimum sound reduction index, averaged over the frequency range 100 – 3150 Hz, of 20 dB.

The requirement was achieved by installing secondary glazing with absorbent-lined reveals and having staggered openings to provide ventilation. Post-construction testing at the time confirmed that this requirement was satisfied when the new internal vertical sliding sash windows were open at the bottom to a height of 140 mm and the existing, inward-opening external top-light was opened to the full extent possible within the 300 mm cavity provided.

In 1989, Drew Primary School was not fully occupied and work was restricted mainly to the ground and first floor areas and staff rooms. South-facing windows were excluded from the scheme, because these face away from the airport and are exposed to much lower levels of aircraft noise than the other elevations.

4. THE 1998 SECTION 106 AGREEMENT

Pupil intake has recently grown at the school and, under the 1998 Section 106 Agreement, London City Airport agreed to extend the scheme to include all classrooms. The sound insulation standards were to be based on standards given in the Department for Education and Employment publication, Building Bulletin 87, Guidelines for Environmental Design in Schools, published in 1997.

5. DFEE GUIDELINES

Building Bulletin 87 recommends that, as a general guide, the noise level from aircraft and trains in teaching classrooms should not normally exceed 55 dB L_{A1}, where L_{A1} is the level exceeded for 1% of the time. It also recommends a limit of 40 dB $L_{Aeq,1h}$ in general teaching, seminar and tutorial rooms, classbases and libraries, where $L_{Aeq,1h}$ is the equivalent continuous A-weighted sound level, averaged over a one hour period. A limit of 35 dB $L_{Aeq,1h}$ applies in assembly halls.

6. EXTERNAL LEVELS

An acoustical survey was carried out at Drew School in April 1998, with a view to establishing the external L_{A1} and $L_{Aeq,1h}$ levels and whether the arrangement previously adopted at the school would meet the DfEE Guidelines.

External noise measurements were carried out on the flat roof of the building, at 3rd floor level, where an unobstructed view could be obtained of aircraft taking off and landing. For each westerly take-off, the L_{AE} level was measured, and a statistical level distribution stored for later analysis. The L_{A01} level for each one-hour period of the measurements was subsequently computed from the cumulative statistics for all aircraft movements in that hour. The $L_{Aeq,1h}$ value was computed using the individual L_{AE} levels.

The following relationship was found to apply:

$$L_{A01} = L_{Aeq} + 6.1 \log N + 8.3 \text{ dB}$$

where N is the number of movements in the period.

This relationship cannot be generalised to other locations. Measurements have been made at another local primary school, which is situated towards the eastern end of the runway. Though there was a similar mix of aircraft, the analysis was restricted to take-offs and the school is a similar distance from the runway, the relationship between L_{A01} and L_{Aeq} was found to be quite different.

For Drew Primary School, the computed external levels for present-day and future operating scenarios are summarised in Table 1. The figures apply to one-hour periods during the normal school day as distinct from the sixteen-hour averages used in the plotting of noise contours.

Also shown in Table 1 are the DfEE noise limits for classrooms and, using the future scenario, the noise reduction required through the building envelope to classrooms. It can be seen that it is, the L_{Aeq} level which, by a very small margin, dictates the requirements, rather than the L_{A01} level.

	$L_{A1,1h}$ dB	$L_{Aeq,1h}$ dB
Current ops, worst hour (9am-4pm), 5 jet and 1 prop departures to W	73	60
Future ops, worst hour (9am-4pm), 6 jet and 4 prop departures to W	75	61
DfEE Guidelines for classrooms	55	40
Reduction required through building envelope to classrooms	20	21

Table 1: Assessed Aircraft Noise Levels and Noise Reduction Requirements

7. REDUCTION OF NOISE THROUGH THE BUILDING ENVELOPE

During the survey, measurements were made of the aircraft noise inside rooms for various window configurations. The difference between the A-weighted level on the roof and in the classroom (D_A) was established for each case. The results are summarised in Table 2. Windows were generally opened to a height of 140 mm on the inner leaf, as determine under the original scheme to correspond to a mean sound reduction index, R_{mean} of 20 dB. (The D_A result is influenced by factors other than the sound reduction index, such as window area, room volume and finishes).

Window Configuration	D_A dB
Rooms with all windows treated and all closed	29-35
Rooms with all windows treated but with staggered openings	22-28
Treated room with untreated south facing windows, windows closed	26
Treated room with untreated south facing windows, windows open	21
Art room, untreated, with broken windows and exposed pitched roof	16

Table 2: Measured Noise Reduction through the Building Envelope

The required minimum reduction through the building envelope, D_A, to meet the DfEE classroom limits for future operations (worst-hour scenario) is 21 dB and 26 dB for the school hall. The measurements demonstrate that previously treated rooms meet these requirements when the double windows have staggered openings for ventilation. In particular, it would remain unnecessary to treat south facing windows in order to meet the DfEE limits under future operating conditions. It was therefore concluded that the scheme of secondary glazing should be extended to include the north, west and east facing windows of previously untreated classrooms and staff rooms.

8. PRACTICAL RECOMMENDATIONS

During a window survey carried out at the time of the acoustical survey, the previously installed glazing was found to have significant defects and had become unsafe to operate and maintain. It was concluded it had reached the end of its useful life and that it should be replaced by an

alternative design of secondary glazing, based on similar principles for sound insulation and ventilation. An inherently safe-to-operate, low-maintenance design was developed, as illustrated in Figure 1 and this has recently been installed at the school.

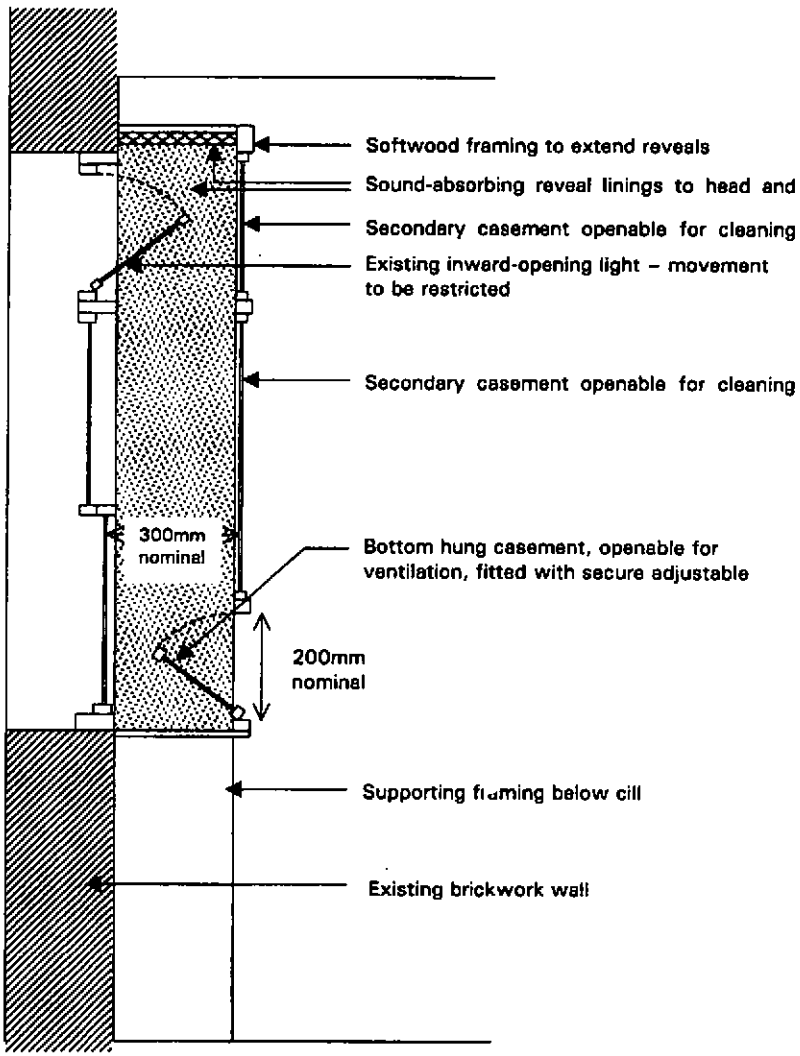

Figure 1: Section Through Secondary Glazing at Drew School