

Report from the First Meeting of the Nordic Voice Ergonomic Group - Reykjavík, 7th - 8th May 2006

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Introduction

Many voice studies have shown that voice problems are common amongst voice users who work as professional communicators e.g teachers. These problems cost a considerable amount of money each year (Verdolini and Ramig, 2001). Until recently, the situation concerning the occupational safety and health of voice and speech professionals has been poor in Europe, as voice has not yet received recognition as an occupational tool to which employers must give care and attention (Vilkman, 2001). Furthermore, voice disorders specified as an occupational disease do not fall directly within the usually accepted definition of what constitutes an occupational disease (Sala et al., 2002). National legislation has suffered from a lack of knowledge concerning the environmental and ergonomic aspects of voice disorders as an occupational health problem

Demanding speaking conditions are linked with poor listening environment. Indeed, unsuspected hearing problems are common in children. Reverberation time is too high in many classrooms (e.g., Crandell and Smaldino, 1994). Asha (1995) stated that a level of 0.4 s is to be recommended, especially for young listeners. The signal to noise ratio (teacher's voice measured against activity noise in the classroom) does not reach recommended levels for young or handicapped listeners (15 dB) (e.g. Leventhall, 1998). Distance from the teacher may be too great to allow the students to hear clearly the teachers' instructions (Leavitt and Flexer, 1991). Activity noise levels in occupied classrooms have been measured on average, 56 - 77 LAeq (Shield and Dockrell, 2003; Airey, 1998), and in occupied preschool rooms 62 – 73 LAeq (Sala et al., 2002).

Up to now, in no European country legislation ensure effective communication conditions in places such as in educational buildings.

Due to the concern of shortage of voice and listening ergonomics, voice experts from the 5 Nordic countries participated in a meeting held in Reykjavík 2006. The purpose of the meeting was to examine and compare legislation in the Nordic countries on noise levels and reverberation times, and to discuss a common future view on legislation to prevent disturbance in speech communication. It was decided that the group should focus on conditions in classrooms and educational buildings in relation to a) teachers' voice problems and b) speaking and listening conditions.

The specific aims of the meeting were the followings:

To discuss a common future view on the legislation for preventing disturbance in speech communication for the benefit of adults and children.

To compare Occupational Health and Safety at Work legislation on acoustics and activity noise levels in classrooms in schools and preschools in all the Nordic countries

To identify ways in which an overview of legislation on communication conditions in classroom could be obtained.

To initiate cooperation between Nordic countries in matters affecting the ergonomics of communication.

To establish a Nordic website on information about the ergonomics of voice, hearing and communication

Participants of the meeting:

Finland: Eeva Sala M.D., PhD. Phoniatician

Leena Rantala PhD. Speech and language therapist

Iceland: Anna Björk Magnúsdóttir ENT surgeon. Phoniatician

Valdis Ingibjörg Jónsdóttir PhD. Speech and language therapist

Norway: Irene Bele PhD. Speech and and language therapist

Sweden: Lucyna Schalén PhD. ENT surgeon. Phoniatician

Maria Södersten PhD. Speech and language therapist

Denmark: 2 representatives from Phonic Ear, Allan Teisen and Søs Lyngby , sales managers.

Outcome of the meeting

The meeting concluded that current legislation in all the Nordic countries is inadequate, and that classroom conditions are detrimental to the voice and unsatisfactory for the listener, so that adequate communication does not take place (e.g. existing legislation permits too great maxima for background noise levels and reverberation time).

The outcome of the meeting was twofold. It was agreed that

- a. further legislation is needed to ensure favourable listening conditions in places such as classrooms and to protect the voice as an occupational tool.
- b. a statement should be forwarded to the relevant authorities in the 5 Nordic countries to the effect that legislation should be introduced to protect the voice as an occupational tool and to ensure the rights of listeners to hear the speaker. This statement would be signed by the voice specialists.

The participants thank Phonic Ear from Denmark, which sponsored the meeting.

The Statement:

First Meeting of Nordic Voice Ergonomic Group Reykjavik 7th/8th May 2006

Background

The goal of the present meeting was to discuss a common future view on the legislation for preventing disturbance in speech communication for the benefit of adults and children. Voice experts from the five Nordic countries participated in the meeting.

Many persons in modern society suffer from voice disorders due to environmental factors. Voice disorders are increasing because of increasing noise exposure and increasing vocal loading. Speech communication deteriorates in such conditions.

Voice ergonomics deals with all the measures that: increase performance in speech communication, decrease risk for voice disorder and enable recovery from a voice disorder.

A number of risk factors for voice disorder have been specified in several reports; background noise, poor acoustics, working posture, poor indoor air quality, duration of voice usage and speaking distance.

Legislation for occupational safety and health related to speech communication differs in Nordic countries. The focus of this legislation does not specifically deal with risks for voice disorders/speech communication at all. The noise exposure impact on hearing is however well understood and the rules are applied in practice. The same ought to be done within the field of voice and speech communication. Recent research, not least in Nordic countries, provides information on how to protect the voice against environmental risks and prevent voice disorders.

Legislation (given in the table) exists for example on acoustics in ordinary classrooms, whereas background noise due to activity is not considered at all although it is a crucial factor for speech communication.

Country	RT (s)	RASTI	Noise level*
Denmark	$\leq 0,9$		35 $L_{A,eq}$
Finland	0,5-0,6	$\Rightarrow 0,80$	28 $L_{A,eq}$
Iceland	$\leq 0,8$		35 $L_{A,eq}$
Norway	$\leq 0,8$		32 $L_{A,eq}$
Sweden	$\leq 0,6$		35 $L_{A,eq}$

RT= Reverberation time, RASTI= Rapid Speech Transmission Index, Noise level is noise caused by heating, plumbing, air-conditioning and electric appliances in the building.

Future meetings will be held with the aim of supporting our common efforts for improvement of voice and speech communication in our societies.

Discussion

Noise and children are inescapably linked. Study results have shown how activity noise in classroom is too high to enable unstrained voice use. Additionally, it is too high for the voice capacity to reach the recommended level for signal to noise i.e. 15 dB above the noise. Legislation is required which can secure ergonomic voice use and good listening conditions for young listeners in classrooms; this can be effected by defining acceptable

activity noise levels and recommended reverberation times, and by requiring good design of educational buildings. Other measures could involve the use of amplification, which study results have shown to be beneficial to both teachers and students, and guiding school policy e.g. on the number of students in a classroom.

An audible and durable voice, a satisfactory acoustic environment and an appropriate distance between the listener and the speaker are fundamental to all successful lessons. Members of the colloquium had a considerable amount of information about notorious speaking conditions of schools and identified among the reasons for the present unsatisfactory situation -

- General lack of knowledge about voice (voice production, voice protection, voice capacity)
- Physiological factors (e.g. prolonged voice use, gender)
- Psychological factors (stress e.g. inherent in the occupation)
- Environmental factors (e.g. background noise, activity noise, reverberation time, distance between speaker and listeners)

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