Final Report of Project

Project Code: 2006/0127

Project Name: Teacher's Voice Risk Calculator: Reducing the risk of Developing Voice Problems in Teachers

1. Attainment of Objectives

Objective statement 1

To develop a Teacher's Voice Risk Calculator to identify teachers who are at risk of voice problems

Activities related to the objective

A set of five questionnaires were available online since August 2008. The questionnaires included the Chinese Voice Handicap Index-30 (VHI; Lam et al., 2006), Voice Activity and Participation Profile (VAPP; Ma & Yiu, 2001), a General Teaching Survey, the General Voice Risk Calculator (Ho & Yiu, 2006) and the Cross-cultural Personality Assessment Inventory-2 (CPAI-2) (Cheung, Leung, Song, & Zhang, 2001).

Chinese Voice Handicap Index-30 (Lam et al., 2006). The VHI-30 is a validated and widely used voice treatment outcome measurement (e.g., Pribuisiene, Uloza, Kupcinskas, & Jonaitis, 2006; Thomas, de Jong, Cremers, & Kooijman, 2006). The Chinese version was validated in Hong Kong (Lam et al., 2006).

Voice Activity and Participation Profile (Ma & Yiu, 2001). The VAPP was used to measure the impact of voice problem on teachers' quality of life. It is a Hong Kong-based, validated self-assessing questionnaire that measures the participant's self perceived voice impairment and impact of voice problem on his/her job, daily communication, social communication and emotion.

Cross-Cultural Personality Assessment Inventory (CPAI-2; Cheung et al., 2001a, 2001b). The CPAI-2 was be used to investigate the personality traits, anxiety and depression levels expressed in teachers. The CPAI-2 is a validated and standardized personality test that is specifically designed for the Chinese population. Subscales from the CPAI-2 was selected for use in this project. The selected subscales have been shown by Cheung et al. (2001) to represent neuroticism and extraversion, which have been associated with voice problems (Roy, Bless, & Heisey, 2000). The CPAI-2 clinical scales on anxiety and depression was also included, as Roy et al. (2000) have shown that teachers with voice problems are associated with higher anxiety and depression levels than those without voice problems.

Voice Risk Calculator (VRC; Ho and Yiu, 2006) and the General Teaching Survey (GTS). The two questionnaires were combined to investigate areas such as current vocal condition, vocal load at work, general health conditions, work environment and teaching duties.

Upon completion of the online questionnaires, the participants were informed of their scores with reference to normative data. General guidelines on voice care and referral services for voice therapy were given to all.

Extent of attainment of the objective

90% achieved.

Evidence or indicators of having achieved the objective

A teacher specific Voice Risk Calculator is developed for the study. Based on a dataset with 115 teachers who have completed both the VRC and the VHI, preliminary data analysis using multiple regressions (that excluded the CPAI-2 results) showed four factors were related to the self-perceived severity level. The four factors were voice loading at work, general health condition, vocal care habits and voice loading in social context. Further data analysis is being carried out to develop a 'formula' for calculating the risks for developing voice disorders in teachers. Such 'formula' will be used to identify 'at risk' teachers and be made available at the Voice Research Laboratory's website: http://www3.hku.hk/speech/greenvoice/index.htm. By completing this formula, the objective will be 100% achieved.

Objective statement 2

To prevent and reduce voice problems in teachers by using appropriate strategies for inadequate classroom acoustics

Activities related to the objective

Acoustic measurements were taken from four classrooms in each participating kindergarten, primary and special school, and ten classrooms in each secondary school. The kindergarten, primary and special schools' measurements were taken in a lower grade (K1 or P1) and a higher grade class (K3 or P6) during a 'quiet' and a 'noisy' lesson (e.g., a story-telling versus exercise time; language class versus physical education class). The measurements from the secondary schools included measurements from a lower grade (S1 or S2) and a higher grade (S4 or S6) class during the following lessons: language, science (in laboratory), Design and

Technology, Home Economics and Physical Education. The measurements were taken twice from schools that would turn the air-conditioning off during winter (once during summer when air-conditioners were turned on and once during winter when air-conditioners were turned off).

Two types of measurements were collected. The first was a description of the acoustic facilities available in the classroom. The checklist of facilities was based on those suggested by Choi and McPherson (2005), which included checking for the presence of carpets, draperies, acoustic ceiling tiles, partitions, acoustical wall treatments, acoustically modified furniture and double-glazed windows. The second type of measurement included the noise level and the speech levels of teachers during class. The noise and speech levels were measured using a sound level meter, using a dB A-weighted scale. All participating teachers were also invited to complete a Chinese Voice Handicap Index-30.

Extent of attainment of the objective

90% achieved.

Evidence or indicators of having achieved the objective

Appendix A shows the speech and noise levels in each school and subject type. High noise levels were obtained in the participating classrooms (67dB to 81dB). All classrooms did not include any carpets, draperies, acoustic ceiling tiles nor acoustically modified furniture. Only 1.6% of the classrooms had double glazed windows. Around 51% of the classrooms had some type of acoustical wall treatments, such as boards and soft materials on walls, but such treatments were only on part of the walls in the classrooms.

The American National Standards Institute (ANSI) recommends that there should be a 15dB difference between the speech signal and noise level (signal to noise ratio, SNR). In the participating classrooms, the SNR ranges from -13.9dB to 26.7dB, with a mean of 5.9dB. Of the 248 classrooms measured, only 6.9% (17 classrooms) were able to meet the ANSI recommended SNR.

Given that such high noise levels and poor SNR were obtained in most classrooms, it is suggested that more acoustical treatments can be implemented in the classrooms. A list of practical, cost effective acoustical treatments suggestions are being currently prepared and will be sent to the participating schools along with their school specific noise and speech measurements. Once the school report is sent out, the objective will be 100% achieved.

Objective statement 3

To prevent and reduce of voice problems in teachers by providing voice training workshop and internet resource support

Activities related to the objective

Voice protection workshops were given to teachers of two kindergartens, one primary school, two secondary schools and two special schools. The teachers from these schools were randomly assigned into two groups, the voice training (experimental) group and the no training (control) group.

Voice Training Workshops

The teachers in the experimental group were invited to participate in the voice workshop at the start of the project and those in the control group were invited to participate in the voice workshop at the end of the project. The voice training workshops were delivered by a qualified speech therapist experienced in voice therapy. Each workshop included information on how to protect the voice and short exercises on how to project the voice for classroom teaching. The workshops were held at the beginning of the academic year (during August and September) in each participating school and once again at the end of the project for the control group and any other teachers in the participating schools. Each workshop was around 2-hours long. Following the completion of the training workshops, the participants were provided with internet support covering vocal exercises and information on vocal hygiene. All participants completed the Voice Handicap Index-30 at the beginning of the project and one year after.

Extent of attainment of the objective

70% achieved.

Evidence or indicators of having achieved the objective

A total of 112 teachers participated in the study, 59 were in the experimental group and 53 were in the control group. Follow up questionnaires were not obtained in two schools because of a change in school personnel. This led to a high attrition rate of nearly 75%. A total of 31 complete sets of pre-training and follow up questionnaires that could be matched were obtained. Of these 28 of them were from the experimental group and three were from the control group. Due to the small sample size, results from the experimental group showed that the VHI scores were not significantly different between the two time-points (pre-workshop and 1-year after). No comparison between the two groups could be made because of the small group size for the control group. Without a direct comparison, it is difficult to draw a conclusion that the workshop was effective in preventing voice problems

in teachers. However, literature shows that voice workshops that are similar to the one used in the current project were effective in preventing voice problems in teachers (Bovo, Galceran, Petruccelli, & Hatzopoulos, 2007; Ilomaaki, Laukkanen, Leppaanen, & Vilkman, 2008; Oates, Pasa, & Dacakis, 2007). We admit that this objective is under-achieved. Our team, however, is currently following this up despite the funding from QEF is completed. We have funding from National Institute of Health (USA Government) and work is in progress to enable us to collect a sufficient large sample size to have the appropriate statistical power.

2. Project Impact on

i) Increasing training opportunities for teachers and enhancing their professional development

The voice training workshop was given to seven schools. The voice workshops aimed to improve the voice protection awareness in teachers and in turn aimed to prevent the occurrence of voice problems. All teachers in the participating schools were invited to join the workshop.

ii) Improving learning atmosphere

Past studies have shown that noisy environment may have an adverse effect on students' learning ability, especially those with learning difficulties (Dockrell & Shield, 2006; Nelson & Soli, 2000). The present study is the first study to survey the acoustics environment in different types of schools in Hong Kong. The data will be useful for designing better acoustical environment in Hong Kong classrooms. The investigators are planning on a follow up study that aims to implement and evaluate cost effective acoustical facilities in classrooms.

3. Cost-effectiveness

i) Utilization of available resources

The project was well supported by the Division of Speech & Hearing Sciences, The University of Hong Kong, in terms of technical support (for hosting the websites used in this project) and clerical support.

ii) Unit cost for the direct beneficiaries

It is difficult to calculate the unit cost for this study. Around 400 teachers have completed the online questionnaires, 38 schools have participated in the classroom acoustics measurement and seven schools have participated in the voice protection workshops. All services were provided free of charge to the participants. All phases of this project can help teachers to gain better understanding of their voice use and how to better protect their voices.

iii) Sustainability of the learning programme and materials developed

The Voice Risk Calculator developed in this project will continue to be available to the public through the Voice Research Laboratory's website (http://www3.hku.hk/speech/greenvoice/index.htm). Likewise, the classroom acoustics improvement guidelines and the voice protection workshop materials will also be available to the public through the same website.

iv) Expenditure items which require no injection of resources when the project is replicated by other schools

The Voice Risk Calculator may be used by other investigators at no additional cost. However, the investigators will need to set up their own online database for hosting and collecting the data. The voice protection workshop materials may also be used by other

schools at no cost. The materials maybe of specific use to schools with school-based speech therapists who can use the materials for holding school-based voice protection workshops.

v) Alternative approaches for equivalent benefits at less cost

Currently, there is no other validated voice risk questionnaires available in Hong Kong. The classroom acoustics measurement may be carried out by private environmental consultancy firms, but the cost for this is unknown. It is unlikely that the cost would be less than that used in this project. The voice protection workshops maybe held by school based-speech therapist (funded by Education Bureau's school-based speech therapy program), most likely at a similar cost as the one used by this project. In summary, it is unlikely that the current project may be operated by a different approach for equivalent benefits at a lower cost.

4. Deliverables and Modes of Dissemination

Please refer to Appendix C for the table on dissemination value of project deliverables.

5. Activity List

1. Completion of online questionnaires (Objective 1)

The 5 questionnaires mentioned in objective 1 above were made available at the Voice Research Laboratory since August 2008. Around 400 teachers have completed at least one of the online questionnaires since August 2008. Some of the teachers have mentioned that the questionnaires took too long to complete, therefore, when the refined protocol will be launched in July 2011, only the Voice Risk Calculator will be included. This should only take around 10 minutes to complete.

2. Classroom acoustics measurement (Objective 2)

Acoustics measurements (as mentioned in objective 2) were taken from nine kindergartens, nine primary schools, 11 secondary schools and nine special schools in Hong Kong. Nine of these schools were visited twice during the year, once when air conditioners were turned on and once when air conditioners were turned off. A total of 248 classrooms were measured. A total of 163 Voice Handicap Index questionnaires were collected from teachers of these classes. The school management teams were especially interested in knowing if the speech levels in schools are appropriate or not. The teachers were highly cooperative during the acoustics measurement and did not find the research team disturbing their classes.

3. Voice Training Workshops (Objective 3)

Voice training workshops were delivered in seven schools. The workshops were

delivered twice in three schools, once at the beginning of the project and once at the end of the project. Around 130 teachers have attended the workshops. Post-workshop evaluation questionnaires showed that most participants found the workshop useful and they especially liked the voice exercise section.

6. Difficulties Encountered and Solutions Adopted

Subject recruitment was the major difficulty faced by this project. The H1N1 epidemic, school closures and tighter visiting control at schools have made it difficult to carry out the acoustics measurement in schools (objective 2). An extension of the project period was sought to partially overcome the problem. Attrition rates was also higher than expected, probably due to changes in the administration of the schools which resulted in subsequent termination of collaboration and participation.

Feedback was received from teachers who completed the online questionnaires. The teachers reported that it took too long to complete the full set of questionnaires. As a result, the online questionnaires (objective 1) were reduced from five questionnaires to three, so that more teachers may complete the full set online.

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female student teachers. *Folia Phoniatrica et Logopaedica, 58*(2), 65-84.

Appendix A

The speech and noise levels and the Voice Handicap Index scores for each subject type, grade level and type of schools.

School type	Subject type	Grade level	Speech level			Noise level			VHI		
			N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
KG	Language	Low	7	73.93	1.58	7	67.21	1.62	4	27.00	6.80
		High	16	73.62	0.93	16	66.62	1.79	14	24.93	7.00
	Physical	Low	5	79.63	1.76	5	81.31	2.17	3	23.00	8.74
	Education	High	16	76.51	1.17	16	79.07	1.44	12	22.25	8.30
Primary	Language	Low	12	76.05	1.34	12	70.21	1.71	9	24.22	4.88
		High	12	79.79	1.55	12	69.60	1.98	9	20.22	4.25
	Physical	Low	11	80.95	0.93	12	76.75	1.73	8	19.88	3.59
	Education	High	10	76.87	0.94	10	76.87	1.34	7	25.00	7.51
Secondary	Language	Low	16	79.18	1.22	16	67.64	1.63	9	22.67	4.10
		High	15	76.49	1.13	15	67.50	1.33	8	17.75	3.67
	Physical	Low	24	77.94	0.95	24	72.97	1.07	9	30.67	6.84
	Education	High	9	79.57	1.60	9	75.26	0.49	5	21.40	5.41
	Science	Low	15	81.35	1.27	14	70.01	1.55	7	15.43	2.35
		High	14	75.15	1.56	14	66.64	1.94	9	17.67	3.54
	Home	Low	13	75.11	1.51	13	68.76	1.16	7	24.14	5.63
	Economics	High	0			0			0		
	Design &	Low	9	78.06	1.35	9	70.33	2.48	3	24.33	7.33
	Technology	High	1								
Special	Language	Low	12	73.57	1.63	11	66.58	2.62	10	15.10	3.06
		High	11	75.06	1.16	11	68.83	1.55	10	16.80	3.72
	Physical	Low	10	77.20	2.30	11	76.21	2.20	11	22.00	5.56
	Education	High	8	79.66	2.05	8	75.08	2.48	8	27.50	6.81