

The effect of school location on retention of knowledge learned from an educational hearing conservation program

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INTRODUCTION

Lipscomb listed several formats of educational hearing conservation program (HCP) in his book and had compared their advantages and disadvantages (Lipscomb 1994). These formats included lecture series, movies, videos, and slide presentations, programmed learning booklets, computer assisted instruction (CAI), distribution of printed materials, individual conferences. Research indicates that all these formats of educational HCP not only achieve certain degree of success in terms of its effectiveness but also in various educational levels (Blair et al. 1996; Brookhouser et al. 1992; Chermak et al. 1996, 1998; Chermak & Peters-McCarthy 1991; Griest et al. 2007; Lass et al. 1987a, b; Lewis 1989). Schools do not provide enough information in educational HCP (Frager & Kahn 1998). Teachers' knowledge in educational HCP needs to be improved as well (Lass et al. 1985). It is imperative to provide educational HCP in different levels of schools. However, it is unknown how would children retain the knowledge learned from the educational HCP and how would school location affect it. Do we need different approaches in administering the program according to different school location? The purposes of the study were to investigate (1) the effectiveness of an comprehensive educational HCP on elementary school children, and (2) the effect of school location on children's retention of knowledge learned from an educational HCP.

METHODS

A 45-minute educational HCP was designed for elementary School students. It consisted of a lecture, poster-exhibition, questions and answers, games, demonstration and trying-on of hearing protection devices, and a distribution of earplugs.

SUBJECTS

Participants were 3rd-graders of elementary schools. Among them, 27 (48.2%) were from a school in the rural area and 29 (51.8%) were students of a school located in the city. The gender distribution of the subjects was depicted in Figure 1. There were more girls in the school located in rural area than in the city.

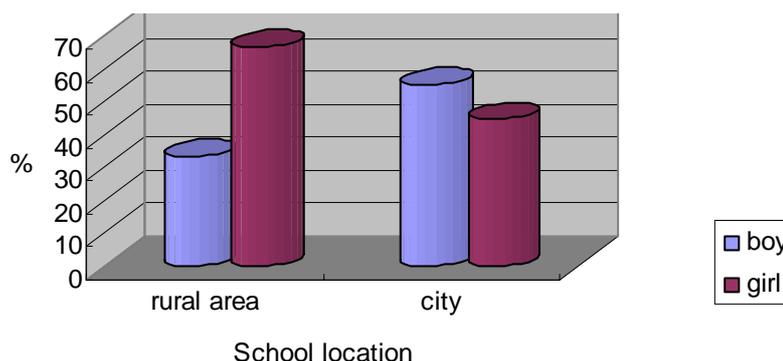


Figure 1: Subjects' gender distribution

Tool

A hearing conservation questionnaire (HCQ) was developed to assess subjects' knowledge in general health of hearing, noise hazard, and strategies in hearing protection. It included 21-items of questions and could be scored in three different subtests, which were general health of ears (6 items), noise hazard (6 items), and hearing protection (9 items). Children answered them with yes, no, or "do not know". "Do not know" was considered as an incorrect answer. The total numbers of correct items were summed as the raw scores. Percentage scores were calculated with raw scores divided by the number of items in the whole test and they were used for further analyses.

Procedures

HCQ was administered at three different intervals, prior to the educational HCP (pre-test), one day after (post-test), and two-months later (delayed-test).

RESULTS

A mixed design was adopted in the study. Subjects' scores in HCQ were used as the scores for dependent variable (Fig. 2). The test-interval was the independent variable for testing the within subject effect and the school location was the independent variable for testing the between subject effect. A two-way ANOVA was applied on the data. The results indicated a significant interaction between the above two variables ($p < .01$) (Table 1). A simple main effect was then examined and the results were shown in Table 2. In terms of the effect of school location, no significant differences were observed either in the pre- or in the post-scores between different schools. However, school location does make a difference in delayed-test scores ($p < .01$). City-school subjects scored higher than rural-school subjects. As for the test-interval effect, rural-school subjects scored the highest in the post-test, followed by the delayed-test and then the pre-test. City-school subjects performed equally well in the post- and the delayed-tests and both scores were significantly higher than those in the pre-test.

The comparison between the pre- and the post-measurement indicates the effectiveness of the educational HCP, regardless of the school location. However, the interaction between the intervals of measurement and the school-location upon children's performance in HCQ showed that school location would affect children's performance in educational HCP. Two months after they participated in the educational program, city-school children kept on increasing in their HCQ scores, whereas rural-school children scored significantly lower than what they did in the post-test, even though still higher than the pre-test scores. The difference in scores of delayed-test between two groups of students was statistically significant ($p < .01$). Obviously, the retention of knowledge in educational HCP was affected by school-locations.

It seems that once city-school children learned in the classrooms, they kept on absorbing information from different resources and this helps them to achieve better performance in the delayed-test. Rural-school children did not show the same type of learning mechanism. Instead, their scores dropped a little bit after the administration of the educational HCP two months later, although not to a significant degree. It might be necessary to have a second session of educational HCP for children of rural school, to refresh them with the concepts they learned in the program.

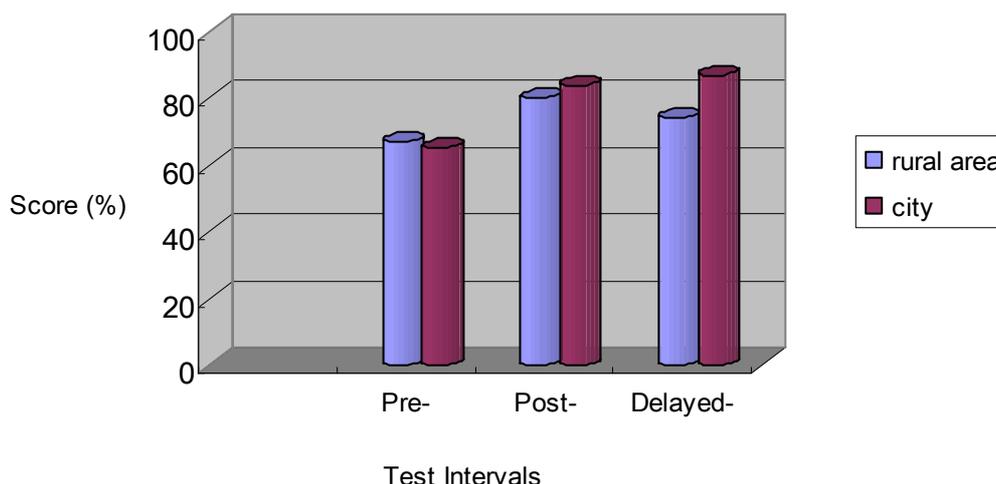


Figure 2: Subjects' scores at different test intervals

Table 1: Results of two-way ANOVA

	Sum of square	df	Mean square	F	P or Post hoc analysis
Test intervals	.835	2	.417	36.359	.000
School location	.105	1	.105	2.326	.133
Test intervals * School location	.152	2	.0758	6.607	.002
Error (Test intervals)	1.24	108	.0114		
Error (School location)	2.433	54	.0451		

Table 2: Results of analyses in simple main effects of test intervals and school locations

	School location				T-test	
	Rural area (N=27)		City (N=29)		T-value	p
Test intervals	Mean	Standard Deviation	Mean	Standard Deviation		
Pre-	.67	.13	.65	.19	.43	.671
Post-	.80	.13	.84	.18	-.95	.346
Delayed-	.74	.11	.87	.14	-3.7	.001
ANOVA	p< .001 post- > delayed- > pre-		p< .001 post-, delayed- > pre-			

CONCLUSIONS

The comprehensive educational HCP administered in this study did improve 3rd graders' knowledge in hearing conservation and they did retain the knowledge they learned in the educational program no matter where the school was located. However, the school location had a significant effect in children's retention of the knowledge. City-school children retained the knowledge better than their rural peers. Based on the fact that city-school children's delayed-test scores were a little bit higher than their post-test scores, it is suspected that they kept on learning even after the cessation of the program. The rural-school children's performance in the delayed-test dropped a little bit. It is unknown whether there will be a time that they are going to perform as if they have never learned any concept in hearing conservation. It is suggested that it is necessary to have a review class for the rural-school children.

REFERENCES

- Blair JC, Hardegree D, Benson PV (1996). Necessity and effectiveness of a hearing conservation program for elementary students. *J Educ Audiol* 4: 12-16.
- Brookhouser PE, Worthington DW, Kelly WJ (1992). The effectiveness of an educational hearing conservation program for elementary school children. *Laryngoscope* 102: 645-655.
- Chermak GD, Peters-McCarthy E (1991). The effectiveness of an educational hearing conservation program for elementary school children. *Lang Speech Hear Serv Schools* 22: 308-312.
- Chermak G.D, Curtis L, Seikel JA (1996). The effectiveness of an interactive hearing conservation program for elementary school children. *Lang Speech Hear Serv Schools* 27: 29-39.
- Folmer RL (2004). Why aren't hearing conservation practices taught in schools.
http://www.healthyhearing.com/hearing_library/article_content.asp?article_id=151
- Fragar AM, Kahn A (1998). How useful are elementary school health textbooks for teaching about hearing health and protection? *Lang Speech Hear Serv Schools* 19: 175-181.
- Griest SE, Folmer RL, Martin WH (2007). Effectiveness of "dangerous decibels," a school-based hearing loss prevention program. *Am J Audiol* 16: S165-S181.
- Lass NJ, Carlin MF, Woodford CM, Campanelli-Humphreys AL, Judy JM, Hushion-Stemple, EA (1985). A survey of classroom teachers' and special educators' knowledge of and exposure to hearing loss. *Lang Speech Hear Serv Schools* 16: 211-222.
- Lass NJ, Woodford CM, Lundeen C, Lundeen DJ, Everly-Myers D (1987a). A survey of high school students' knowledge and awareness of hearing, hearing loss, and hearing health. *Hear J* 40: 15-19.
- Lass NJ, Woodford CM, Lundeen C, Lundeen DJ, Everly-Myers D (1987b). A hearing conservation program for a junior high school. *Hear J* 40: 32-42.
- Lerman Y, Feldman Y, Shnaps R, Kushnir T, Ribak, J (1998). Evaluation of an occupational Health education program among 11th grade students. *Am J Industr Med* 34: 607-613.
- Lewis D (1989). A hearing conservation program for high-school-level students. *Hear J* 42: 19-24.
- Lipscomb D (1994). The employee education program. In: Lipscomb D (ed.): *Hearing conservation: in industry, school, and the military* (pp 193-202). San Diego, CA: Singular Publ. Group. Inc.