

Design and Effect of Multimedia Based Health Education Program for Young Children

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Abstract

This study developed an early childhood health education program utilizing multimedia as the means to promote health literacy amongst 5 year-old children. Health literacy is distinguished into health-perception and health-promoting behavior. The educational content of this program consisted of four sub-factors of health; physical health, nutrition, mental health, and safety. This study adopted the Keller's model which consisted of four steps: attention, relevance, confidence, satisfaction (ARCS). This health education program was applied to 56 five-year-old children (the experiment group, 28; the comparison group, 28) for 26 sessions over a period of 16 weeks (from September 30th, 2010 to December 22nd, 2010) in S kindergarten located in Seoul, Korea. First, it was found that the children's 'total' health-perception scores in post-test was higher at a statistically significant level in the experimental group. Specifically, the sub-factors of 'nutrition' and 'mental health' were higher at the level of statistical significance (overall health perception: $t=4.01$, $p<.001$, nutritional awareness: $t=5.56$, $p<.001$, mental health awareness: $t=3.06$, $p<.001$). Second, the total score for health-promoting behavior in the experimental group was higher than the comparison group's total score at a statistically significant level. In particular, 'physical health' and 'nutrition' sub-factors in the experimental group were higher at the level of statistical significance (overall health-promoting behavior: $t=2.92$, $p<.01$, physical health-promoting behavior: $t=2.84$, $p<.01$, nutrition-promoting behavior: $t=3.36$, $p<.001$). These results indicated that multimedia based health education programs were effective in improving children's health literacy.

1. Introduction

The fact that while everyone wants good health, health is not the ultimate value that trumps all others. Maintaining good health is a pre-requisite to live a long and happy life. To realize one's full potential, we start in early childhood to set the foundation for lifelong health. According to the WHO (World Health Organization, 1986), health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. To be healthy is aligned with holistic development and early childhood is the most critical phase of human health development (Kolbe, 2005). In this sense, health education is the foundation of education for all. A child's holistic development through education can be achieved as long as he or she is healthy. This indicates the importance of health from childhood.

Numerous attempts to conceptualize 'health' has been raised in the field of early childhood education. Research influenced by the earlier Piagetian literature of cognitive development assert that children have difficulty in understanding the causal relationship in health. Expounding that children would develop the understanding of illness in the continuum of three levels; rheological (age 2 - 6), concrete-logical (age 7 - 10), and formal-logical (age 11+), with two sub-levels. (Total of six types of illness and health paradigms)

The younger early childhood children would conceptualize that illness is caused by naughty behavior to be punished (Bibace & Walsh, 1981). In recent, Neo-Piagetian approach suggested that young children have in difficulty in understanding the causality of illness because of the lack of health information. Siegaler and Share (1990) argued that children's interpretations of questionnaires in the previous studies were problematic because of the irrelevance to children's daily experiences. Moreover, children were found to like biological causes of health problems and rejected social-psychological causal explanations (Smith & Williams, 2009). However, the recent studies did not consider the relatedness of health information and behaviors as well as the appropriate teaching and learning methods.

Chung and Chen (2009) indicated that the use of multimedia has changed student's learning processes and performance in science, mathematics, and literacy (Gee, 2003) to indicate the potential of multimedia to teach health education. Computer-based health related videos and games were recently developed and researchers have started to investigate its impacts on children's



performances. Many of these studies found that multimedia based health education facilitate children's health related perceptions and behaviors. However, previous research studies related to health education and multimedia have not only focused on elementary, middle, and high school students but honed in on a single sub-factor of health education such as physical health, nutrition, mental health, and safety. Deviating from previous research, this study discussed about multimedia based health education program for kindergarten children from the holistic perspectives of the balance among previously mentioned 4 sub-factors of physical health, nutrition, mental health, and safety in health education.

1.1 The Purpose of the study

This study designed a health education program geared towards 5 year old children using multimedia. Health serves as a foundation for success in academic, social, and economic achievement in lifetime. As the number of dual-income households increased, kindergarten teachers would take the additional role in teaching health education for young children. These teachers felt ill-equipped for this responsibility, in part from the lack of teaching materials and resources. This lack is not a financial shortcoming as there are few health education programs designed for preschoolers which exist.

To address this need, an early childhood health education program was developed utilizing multimedia for 5-year-old children aiming to increase their health literacy. This study will seek to apply it to examine the effects of the designed program, and measure the contribution in promoting children's health perception and behavior.

1.2 Research questions

- What objectives, goals, educational content, teaching methods, evaluation approach would be appropriate to develop a multimedia based health education program for the five year old preschooler?
- What effects of early childhood health education program utilizing multimedia might be expected to affect children's health literacy which is composed of health perception and behaviors?

2. Methods

2.1 Program design processes

This health education program for young children utilizing multimedia was designed in six phases:

Phase 1: literature analysis,	
Phase 2: teacher's demand analysis,	For more in-depth direction of health education program, teachers and professors opinions about health education program development were consulted. Throughout this process, the completed program goals and objectives were defined as fostering health literacy by developing the child's health perception and health-promoting behaviors.
Phase 3: draft program design,	A review of health education program was conducted to identify potential program for use in preschool health education program.
Phase 4: 1st expert consultation,	
Phase 5: a preliminary study,	A preliminary qualitative study was conducted to gather basic information on health education teaching in the kindergarten fields.
Phase 6: the 2nd expert consultation	



The educational contents of this program consisted of four sub-factors of health: physical health, nutrition, mental health, and safety. Each sub-factor included the aspects of health perception and health-promotion behavior.

The teaching and learning strategies of this program are composed of its principles, process, and methods. The basic principle of teaching and learning was to link the contents of health education program with children's everyday life. For this, the thematic topics in the research subject kindergarten were used to build activity streams. In contrast to the previous health education programs, this study sought for the integration of a variety of subjects and types of activities to make children more interested in and learning about health. Moreover, programs were composed of activities which required children to collaborate with the teacher, and peers actively.

This study adopted the Keller's model for the effective teaching and learning process. The procedure consisted of four steps: attention, relevance, confidence, satisfaction (ARCS). Modeling, cooperative learning, communication, problem-solving, and feedback were used as teaching strategies. Multimedia and hands-on materials related to health education were used as teaching and learning materials. Power Point software, CD-ROM titles, Internet sites, video, flash, authoring tools were used to make an interactive multimedia based health education program. By using multimedia, children collected health education information and created a graph, picture, and essay of the given learning topics. The reason to use hand-on-activity materials as well as multimedia was to extend children's learning into their real experiences and to apply their learning about health into their daily life.

2.2 Participants

This health education program was applied to 56 five-year-old children (the experimental group, 28; the comparison group, 28) with 26 sessions for 16 weeks (from September 30th, 2010 to December 22, 2010) in S kindergarten located in Seoul, Korea.

2.3 Data collection and analysis

To determine the effectiveness of this multimedia based health education program, tests to gauge the performance of the participants were conducted before and after applying the program. According to the pre-test, it was found that the experimental and comparison group pre-test results of health perception and health-promoting behaviors did not have a statistically significant difference to be homogeneous groups. After applying the 16-week programs, post-test was conducted using *t*-statistical analysis. The effects of multimedia based health education program were as follows:

3. Findings

First, it was found that the children's 'total' health perception score in post-test was higher at the statistically significant level in the experimental group whose health education program was utilizing multimedia methods. Specifically, the sub-factors of 'nutrition,' 'mental health' were higher in the multimedia used experimental health education group at the level of statistical significance (overall health perception: $t=4.01$, $p<.001$, nutritional awareness: $t= 5.56$, $p<.001$, mental health awareness: $t= 3.06$, $p<.001$).

<Table 1> Multimedia Based Health Education Program Effect on Children's Health Perception

Health perception		Experimental M(SD)	Control M(SD)	<i>t</i>
Total	pre	4.01(.56)	3.93(.45)	0.53
	post	4.38(.46)	3.89(.44)	4.01***
Physical health	pre	4.35(.63)	4.28(.49)	0.47
	post	4.46(.53)	4.21(.57)	1.70
Nutrition	pre	3.73(.77)	3.45(.74)	1.38
	post	4.30(.58)	3.42(.60)	5.56***
Mental health	pre	3.92(.69)	3.79(.74)	0.71
	post	4.31(.60)	3.79(.71)	3.06***
Safety	pre	4.02(.77)	4.22(.61)	-1.08
	post	4.44(.65)	4.16(.60)	1.71

*** $p<.001$



Second, health-promoting behavior 'total' score in the experimental group children's total score was higher than the comparison group at statistically significant levels. In particular, 'physical health,' 'nutrition' health promoting behaviors in the experimental group were higher at a statistically significant level than the comparison group (overall health-promoting behaviors: $t=2.92$, $p<.01$, physical health-promoting behaviors: $t=2.84$, $p<.01$, nutrition-promoting behaviors: $t=3.36$, $p<.001$).

<Table 2> Multimedia Based Health Education Program Effect on Children's Health Behavior

Health behavior		Experimental M(SD)	Control M(SD)	t
Total	pre	3.74(.54)	3.73(.36)	0.19
	post	4.17(.41)	3.83(.47)	2.92**
Physical health	pre	3.74(.78)	3.75(.57)	- 0.06
	post	4.33(.48)	3.96(.49)	2.84**
Nutrition	pre	3.54(.67)	3.63(.52)	- 0.54
	post	4.05(.49)	3.55(.62)	3.36***
Mental health	pre	4.21(.53)	4.05(.54)	1.13
	post	4.26(.67)	4.07(.63)	1.13
Safety	pre	3.64(.71)	3.54(.59)	0.58
	post	4.13(.56)	3.90(.64)	1.37

** $p<.01$, *** $p<.001$

4. Implications

This study indicates that multimedia based health education program is effective to the child's health perception of nutrition (similar with the study results of Gould, 2000; Munguba et al., 2008; Silk, 2008) and mental health (contrast to the findings of the study of Belsky et al., 2007; Hickman, 2006; Magnuson et al., 2007; Zhai, 2008). Moreover, the health promoting behavior was improved in physical health-promoting behaviors (similar with the study results of the study of Bartholomew et al., 2000; Lieberman, 2001) and nutrition-promoting behaviors (contrast to the findings of the study of Brug et al., 1999; Bruga, Campbell, & van Assemac, 1999). This study implies that the balanced development of health perception and promoting behaviors can be approached by the use of multimedia based health education program from holistic approaches in early childhood education. More long term treatment experimental studies can be considered to investigate the multimedia based health education program for the overall health related areas.