The Effects of the Preventive Dentistry Audio-Visual Instructional Program on the Knowledge, Attitude and Behavior of Elementary School Aged Children in Romania

by

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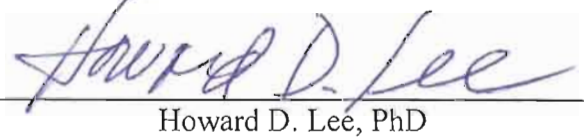

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Abstract

A significant problem in Romanian elementary schools is that many children have poor oral health and do not receive satisfactory oral hygiene instruction at home or dental office. In Romania, little research has been conducted in utilizing an audio-visual instructional program to teach preventive oral hygiene concepts and methods to elementary school aged children in the classroom and investigate how the program could affect the student's knowledge, attitudes and behavior. The experimental pilot study included 40 third grade students and the study results identified that the audio-visual instruction of preventive oral hygiene concepts and methods in the classroom, improved the knowledge, attitudes and oral hygiene behavior of the Romanian elementary school aged children involved in the study. Educating children toward good oral

hygiene at an early age develops the necessary knowledge and ability to maintain their lifelong oral health.

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Chapter I: Introduction to the Study

Introduction

Oral health is an important part of general health and quality of life. Quality of life relates to the sense of well being of a person or community and is affected by different functional, social and psychological factors, which can be significantly impacted by oral health (Martu & Popa, 2008, p. 38). The pain and discomfort associated with oral disease can be more disruptive and preoccupying than elsewhere in the body, because the oral cavity is central for many daily activities. The oral cavity is important in the quality of life through its role in interpersonal relationships, self image and self perception (Martu & Popa, 2008, p. 38).

Oral diseases remain major public health problems on a global level (FDI World Dental Federation, n. d., p. 1). Although oral health has greatly improved in the western world, there has been a decline in the oral health of populations living in developing countries (Petersen, 2003, p. 1). Oral disease is the fourth most expensive medical condition to treat and in low-middle income countries investment in oral health has low priority (Petersen, 2008, p. 117).

The most common oral diseases are dental caries and periodontal disease (World Health Organization [WHO], 2007, p. 1). They are responsible for the majority of tooth loss. The most common form of gum disease is gingivitis that is often caused by inadequate oral hygiene, and it is reversible with professional dental care and good oral hygiene (Wilkins, 1999, p. 225). Research has unveiled that periodontal disease is linked to pregnancy complications, diabetes, stroke, cancer and heart disease (Weber, 2007, p. 4).

In low income countries 90% of caries remain untreated (FDI World Dental Federation, n. d., p. 1). Dental caries is the most common chronic disease of childhood (Dumitrache, Sfeatcu, & Buzea, 2008, p. 34) and 60 to 90% of school children worldwide have dental caries (WHO,

2007, p. 1). Early tooth decay is a predictor of further dental decay in the future (Children's Dental Health Project [CDHP], 2007, p. 1). The American Academy of Pediatric Dentistry and the American Academy of Pediatrics suggest that early dental care is important to prevent dental caries (CDHP, 2007, p. 1).

One's socioeconomic status is considered a significant factor in children's risk of oral disease and dental caries (Dumitrache et al., 2008, p. 37). In the developing countries of Central and Eastern Europe, Romania included, the prevalence of dental caries in children has remained high and most children do not visit the dentist for preventive purposes, but only emergencies, like dental pain or oral infections (Petersen, 2003, p. 2).

Romania is located in the south-eastern part of Europe and covers an area of 237,500 Km2. The ethnic composition of the population is 89.5% Romanian, 7.1% Hungarian, 1.8% Roma and 1.6% other nationalities (World Health Organization [WHO], 2007, p. 1).

Romanians descend from the Dacians, an ancient people who became a Roman colony in the first century AD. Today's Romanian language is a dialect of Latin. Barbarian tribes forced the Romans out of Dacia in 271 AD. For thousands of years, Romania suffered from the invasion of migrating hordes, from the occupation of the Ottoman Empire, Habsburgic Empire, Russia, which enslaved the Romanian people and plundered its wealth (Library of Congress-Federal Research Division [LC-FRD], 2006, p. 2).

After World War II, Romania came under communist, totalitarian regime, the worst dictatorship in Eastern Europe that brought the country to socioeconomic ruin (Egon, 2004, p. 1). Tight central economic control with severe shortage of food and a suppressed population at threat for imprisonment for even criticizing the regime, in 1989, brought Romania to a National Revolution that marked the breakdown of the Communist era (Egon, 2004, p. 1).

The health care system, including oral health, was under government financing, based on state monopoly, planning and management. Since the health care system was considered unproductive, requiring money rather than generating money, it was under funded, with inadequate health care facilities and equipment (Bara, Heuvel, & Maarse, 2002, p. 446). Due to unsafe blood transfusions in young children in the last years of the Communist Era, Romania had one of the highest rates of children infected with the human immunodeficiency virus, as well as one of the highest infant mortality rates, and the highest incidence of tuberculosis. The rate of anemic children was also high, at about 50% (Unicef, n. d., p. 1).

The transition from the severe centralization to democracy and economic liberalization has not come easily. At first, Romania went through political instability, severe economic decline with significant fall in the standards of living due to double and triple digit inflation. In 1993 the inflation reached 256% (LC-FRD, 2006, p. 12).

The reform and decentralization of health care was not one of the priorities due to financial constraints. The reform started late and the quality of health care has been poor by European standards, still far from what is desired (Unicef, 2001, p. 1). The number of health care professionals decreased due to low income (Bara et al., 2002, p. 448), but the economic reform and growth has resolved enough deficiencies for Romania to receive membership in the European Union, in January 2007. However this has not yet alleviated Romania's poverty (LC-FRD, 2006, p. 12).

Besides the financial barriers that negatively affected the general and oral health care systems, the medical and dental education of the general population has not been well developed (Bara et al., 2002, p. 446). The implementation of general and oral health promotion and disease prevention programs has been a significant need (Petersen & Tanase, 1997, p. 194). In addition

to involvement of parents and dental professionals, the prospects for improved oral hygiene could vastly increase with the assistance of school teachers, through efficient educational programs in the classroom (Petersen, 2003, p. 2). In Romanian elementary school aged children the pattern and level of dental caries have been severe and increasing (Petersen et al., 1994, p. 90). The high prevalence and severity of dental caries indicated that dental health preventive programs and treatments services targeting young children have been urgently needed (I & Adina, 2007, p. 228). The school teachers knew about the poor dental conditions in children (Petersen, Danila, & Samoila, 1995, p. 364) but their level of dental education has been average with a great need of improvement. In order to improve the dental health of school aged children, the teacher's level of knowledge needs to be increased with the goal to establishing school based oral health promotion and prevention (LL & ME, 2005, p. 377).

Statement of the Problem

A significant problem in Romanian elementary schools is that many children have poor oral health and do not receive satisfactory oral hygiene care at home or dental office. In Romania, little research has been conducted in utilizing an audio-visual instructional program to teach preventive oral hygiene concepts and methods to elementary school aged children in the classroom and investigate how the program could affect the student's attitudes, knowledge and behavior.

Purpose of the Study

Many elementary school aged children in Romania do not have the opportunity to receive adequate oral hygiene care from dental professionals or their families. Since all children attend school, the logical choice of venue is to conduct oral health instruction in the classroom, in an affordable, efficient, effective manner which is reproducible to as many children as possible.

The purpose of this study was to determine if audio-visual instruction of preventive oral hygiene in the classroom could improve the knowledge, attitudes and behavior of the elementary school aged children.

The audio-visual instructional program in the classroom could provide essential directions for preventing oral disease and reinforce the information for the children who have been previously exposed to it.

Research Questions

The study sought answers to the following questions:

1. Is there a significant difference in the knowledge mean scores between the experimental group and the control group before the experimental group viewed the audio-visual instructional program?
2. Is there a significant difference in the knowledge mean scores between the experimental group and the control group after the experimental group viewed the audio-visual instructional video program?
3. Is there a significant difference in the experimental group's pre-test knowledge mean and post-test knowledge mean?
4. Is there a significant difference in the mean attitude scores between the experimental group and the control group before the experimental group viewed the audio-visual instructional program?
5. Is there a significant difference in the mean attitude scores between the experimental group and the control group after the experimental group viewed the audio-visual instructional program?

6. Is there a significant difference in the experimental group's attitude pre-survey mean and attitude post-survey mean?
7. Is there a significant difference in the mean plaque scores between the experimental group and the control group before the experimental group viewed the audio-visual instructional program?
8. Is there a significant difference in the mean plaque scores between the experimental group and the control group after the experimental group viewed the audio-visual instructional video program?
9. Is there a significant difference in the experimental group's pre-viewing plaque mean and post-viewing plaque mean?

Importance of the Study

The importance of conducting this study was to determine if audio-visual instruction of preventive oral hygiene concepts and methods in the classroom could improve the attitudes, knowledge and oral hygiene behavior of the Romanian elementary school aged children.

1. Preventive dentistry in Romania is very limited. Many children are not exposed to adequate preventive oral health education in the dental office or at home. As a result, they lack the skills needed to help prevent oral disease. The audio-visual instructional program in the classroom could improve their skills and provide additional assistance in oral disease prevention. Educating children toward good oral hygiene at an early age will develop the necessary knowledge and ability to maintain their lifelong oral health.
2. Teaching children proper oral hygiene techniques at an early age is the first line of defense against common oral problems such as dental caries and gum disease. By enabling students to

develop excellent oral hygiene habits and by improving their motivation to practice the techniques they are taught, participants may benefit throughout their lifetime.

3. The oral health of children is extremely important for their speech development, positive self esteem, physical growth and mental concentration. By increasing the awareness and understanding of the role of oral health in its relationship to general health, and the importance of regular check-ups with dental professionals, it is possible to increase the student's participation in proactive dental care.
4. By teaching children the importance of protecting the teeth, gums and the whole oral cavity from dental microbial plaque, the program has the potential to help reduce serious side effects of dental disease such as infection, pain, gastrointestinal disorders, chewing problems, and malnutrition.
5. Since anxiety and apprehension related to dental office visits are common inhibitors, the program's emphasis on the positive nature of prevention and the helpful role of the dental professionals will aid in alleviating such stress.
6. Oral hygiene is part of everyday life and it is less costly monetarily and psychologically to prevent oral disease than to restore a diseased mouth. Since the health and well being of a nation's children is important for its future and because preventive care is much more cost effective and beneficial than oral disease treatment, it is important to teach children good oral hygiene practices at an early age.
7. This study could provide an effective audio-visual tool for use with elementary children, but it also could provide training for the school teachers who will use it to ensure their message about oral health and its importance is correctly taught. Well trained teachers can have a lasting effect on their students because school is an effective platform for promoting proper

oral health behavior. Oral health messages could be taught and reinforced throughout the school years, which are the most influential stages of children's lives and during which lifelong beliefs, attitudes and skills are developed.

Limitations of the Study

This study was limited to the following:

1. Cooperation of human subjects: When conducting the plaque indices it was necessary to color the teeth with disclosing solution and perform an examination of the disclosed teeth. The participants were supposed to sit quietly with their mouth open until the scoring is completed. This was difficult for some participants.
2. Comparison research: This research was not intended to determine the effectiveness of audio-visual instruction over another type of instruction.
3. Honesty of human subjects: In conducting the research of oral health attitudes and knowledge levels the results were limited to the honesty each student portrayed of their own attitudes and knowledge levels of oral hygiene behavior.
4. Study sample size: The study sample was small in scope due to time constraints- 3 weeks data collection period.
5. Socio-economic and educational back ground of subjects: The factors of equalizing the socio-economic and educational back grounds of the subjects in the experimental group versus the control group were not possible.
6. Long term effects: The long term effect of the program was difficult to assess due to brief data collection time available for the study. While the effectiveness of the audio-visual presentation could be measured relative to change in short term behavior, attitude and

knowledge, determining the lasting effects of the audio-visual presentation would require a longer period of study and assessment.

7. Lack of equipment: The project was intended to be reproducible to reach large numbers of students with information that would produce positive life altering oral health habits, but the lack of audio-visual equipment in many classrooms in Romania would limit the scope of its application.

Methodology

The clinical research trial was a one week single-blind pilot study of 40 children between 9-10 years old selected randomly from one elementary school in Cluj-Napoca, Romania. The experimental group and control group consisted of 20 subjects (10 girls, 10 boys).

A written test was given to both groups to determine the existing attitudes and dental knowledge of the subjects. A plaque index was used to measure dental plaque for both groups, on one quadrant of the dentition selected randomly. One week following the viewing of the Audio-Visual Instructional Program by the experimental group, the written test was re-administered to both groups and the plaque index was performed to both groups. A decrease in the plaque score value would represent an increase in oral hygiene behavior of the children.

Definition of Terms

Dental caries. Dental caries is a pathologic process of external origin that involves softening of the teeth and proceeding to the formation of a cavity. Dental caries is a disease of the dental calcified structures (enamel, dentin, and cementum) that is characterized by demineralization of the mineral components and dissolution of the organic matrix (Wilkins, 1999, p. 272).

Dental plaque. Microbial dental plaque, commonly referred to as bacterial plaque, or dental plaque, is a dense, nonomineralized, complex mass of colonies in a gel-like intermicrobial matrix. It adheres firmly to the surface of teeth, calculus, and fixed and removable restorations. The term microbial dental plaque is more accurate than "bacterial plaque" because microorganisms other than bacteria can be found. The organisms may include mycoplasmas, yeasts, protozoa, and viruses (Wilkins, 1999, p. 267).

Dentition. Dentition is the natural teeth in the dental arch (Wilkins, 1999, p. 237).

Gingivitis. Gingivitis is the mildest form of periodontal disease. It causes the gums to become red, swollen, and bleed easily. There is usually little or no discomfort at this stage. Gingivitis is often caused by inadequate oral hygiene. Gingivitis is reversible with professional treatment and good oral home care (American Academy of Periodontology, May, 2008, p. 1).

Index. An index is an expression of clinical observations in numeric values. It is used to describe the status of the individual or group with respect to a condition being measured (Wilkins, 1999, p. 295).

Oral health. Oral health is being free of chronic mouth and facial pain, oral and throat cancer, oral sores, birth defects such as cleft lip and palate, periodontal (gum) disease, tooth decay and tooth loss, and other diseases and disorders that affect the mouth and oral (American Academy of Periodontology, 2008, p. 1).

Periodontal disease. Periodontal (gum) diseases, including gingivitis and periodontitis, are serious infections that, left untreated, can lead to tooth loss. The word periodontal literally means "around the tooth". Periodontal disease is a chronic bacterial infection that affects the gums and bone supporting the teeth. Periodontal disease can affect one tooth or many teeth. It

begins when the bacteria in plaque (the sticky, colorless film that constantly forms on your teeth) causes the gums to become inflamed (American Academy of Periodontology, 2008, p. 1).

Chapter II: Review of Literature

Introduction

A significant problem in Romanian elementary schools is that many children have poor oral health and do not receive satisfactory oral hygiene care at home or dental office. In Romania, no research has been conducted in utilizing an audio-visual instructional program to teach preventive oral hygiene concepts and methods to elementary school aged children in the classroom and investigate how the program could affect the student's attitudes, knowledge and behavior.

Since all Romanian children attend school, the logical choice of venue is to conduct oral health instruction in the classroom, in an affordable, efficient, effective manner which is reproducible to as many children as possible.

The purpose of this study was to determine if audio-visual instruction of preventive oral hygiene in the classroom, through television, could improve the knowledge, attitudes and behavior of the elementary school aged children in Romania.

This review of literature will encompass the effects of television on children's learning, the use of television in elementary education, dental health and emerging trends toward integrating television into Romanian elementary educational system.

The Effects of Television on Children's Learning

Television has a pivotal, constant presence in our lives (Markham, 1995) and in our modern society children grow up immersed in media and television (Rideout, Vandewater, & Wartella, 2003). The accessibility of television is uneven in some parts of the world, but there are hardly any countries where television cannot be seen. In industrialized countries , like those in western Europe, North America and Japan, nearly 100% households posses at least one

television set, while in Eastern Europe it falls to 50 to 60% , with considerable differences between rural and urban areas (Chevallier & Mansour, 1993).

Children's exposure to mass media is increasing in developed and developing countries. Children are in contact with television at a very early age, often before the age of one (Chevallier & Mansour, 1993) and spend more time watching television than attending school or participating in any other activity (Markham, 1995).

Television has positive or negative effects (Chevallier & Mansour, 1993) which are generally dependent upon the program content (Kirkorian, Wartella, & Anderson, 2008; Fisch, 2005) and message (Anderson, Huston, Schmitt, Linebarger, & Wright, 2001). Research has shown negative effects of television related to violence and aggressive behavior, body concept and self imagine, substance use and abuse patterns (Carney, 2006). Social science research supports the idea that viewing violent television programs can encourage children to learn aggressive behaviors, to cultivate fearful and pessimistic attitudes about the world (Aidman, 1997).

The position of the American Academy of Pediatrics is that children younger than two should not watch television at all (*Children, adolescents, and television*, 2001). The impact of television violence may be evident immediately in the behavior of children or it may become apparent years later, even though an individual's family shows no tendency toward violence (American Academy of Child & Adolescent Psychiatry, 2002). The immediate measurable effects of television watching are imitation of viewed behaviors, participation in displayed or promoted emotions, disruption of normal sleep patterns and disturbances of normal vision. In extreme cases, the consequences of these negative effects can include epilepsy, anxiety, or suicidal behavior (Chevallier & Mansour, 1993).

Children are particularly vulnerable to the messages they see and hear on television (Roy-Bornstein, 2008). The attraction of television's sound and light start very early in life (Kubey, Csikszentmihalyi, & C, 2004) and young children cannot discriminate between what they see and what is real (Children, Adolescents, and Television, 2001) being susceptible to misconceptions through the messages communicated (Bar-on, 2000).

Television can have a positive effect on children (Markham, 1995) by using well designed age appropriate educational programs (Kirkorian et al., 2008). Children who watch Public Broadcasting Service (PBS) are more likely to read, share family activities, become more interested in playing a musical instrument, and be more likely to say they look forward to going to school (Ferreira, 1998). Some television programs like Sesame Street focus on a variety of academic and social skills (Kirkorian et al.) and have been shown to teach preschoolers about alphabet, numbers, cooperation, kindness, caring and helping (Bernard-Bonnin, Gilbert, Rousseau, Masson, & Maheux, 1991). Television often plays a highly relevant role in the formation of a young person's identity (Samaniego & Pascual, 2007).

Compared to other types, television is the most used social medium (Welch, 1995) and becomes part of children's every day communication-they talk about what they had viewed (Lazar, 1998). With advances in technology such as larger screens and high definition imagines, the power of television will only increase and the influences must be handled to enhance the positive and reduce the negative (Kirkorian et al., 2008). Despite the abundance of media (screen media- televisions, computers, DVD players and video game consoles) aimed at very young children, the rapid changes in the media environment has not been accompanied by the same growth in knowledge of its impact on children's social, emotional, cognitive and physical development (Rideout et al.,2003).

Television in Elementary Education

Although most research of television focuses on use at home, a few researchers are evaluating its use in the classroom and in school curriculum (Kirkorian et al., 2008). Television impacts every aspect of society, community, schools and classrooms (Supon & Ruffini, 2009). For years, educators have tried to find ways to enhance instruction and one of the most popular methods to improve instruction delivery has been using screen media in the classrooms (Kendeou et al., 2005).

The use of classroom television to enhance teaching at elementary school level started after World War II , with a continuous increase in scientific knowledge about how television influences the way children think and process the information given (Kirkwood & Foster, 1999). The effectiveness of television as a source of learning is related to its content, to the language used, to individual variables such as intelligence, age and the context in which viewing takes place (Samaniego & Pascual, 2007). Teachers can increase the education value of television by getting involved (Kirkorian et al., 2008), such as being available to answer questions or to help students differentiate between reality and fantasy (Samaniego & Pascual).

Through television programs, the content can be easily repeated to enhance comprehension. Further the transfer of knowledge and learning can be maximized by active teacher involvement (Kirkorian et al., 2008) which includes discussing problems, issues and ideas related to the program (Markham, 1995). Numerous research studies have shown that viewing educational television can result in gain of academic knowledge in elementary school aged children, but there is little evidence regarding transfer of learning, the application of knowledge or skills learned (Fisch, 2001).

Television has proven to be an attractive tool that can be used early in a child's life. Televised stories are highly motivating and can be used at school with a large group of children, making it possible to teach comprehension at various verbal ability levels. (Kendeou et al., 2005). When children are motivated and excited about learning, their strategic thinking improves. Integration of television has increased the level of interest and inquiry learning in elementary social studies (Taylor & Duran, 2006) and produced optimal results in teaching elementary science (Kali & Linn, 2008).

Instructional television is being used widely to teach all types of subject matter and makes a practical contribution to almost any learning task. The lower the grade level, the more likely that television teaching is effective (Seattler, 2007).

Children's Exposure to Television in Romania

Television is the main means of socialization for Romanian children and in 2004, about a third of Romanian city children had a television in their bedroom (The Gallup Organization Romania, 2004). In 2007, 79% of households in Romania had access to cable television, 52% of households with children had two or more television sets and 98% of children's spare time was spent watching television (National Audiovisual Council of Romania [CNA], 2007).

Television in Elementary Education in Romania

In January 2007, Romania adhered to the European Union Standards and it was expected to increase access in schools to information and communication. Elementary education in Romania includes first to fourth grade. In the 105 programs at the elementary school level there are few references to television in the classroom, with a marked unconcern of school program elaborators for the media use (Ciascai & Marchis, 2008).

Most classrooms need updating to use television or to present videotapes and projections. About 1500 schools were equipped with a multimedia system (Jalobeanu, 1996). In rural areas television and internet are present in very few of the schools (Baba, Florescu, & Sirlincan, 2008). Use of television and media in education and school practice is a necessity today and the Ministry of Education and Research of Romania is involved in this approach by targeting funds to provide schools with the tools necessary to use media (Ciascai & Marchis, 2008).

The increase of technology use in schools is anticipated with great expectations for the future due to its potential to be challenging, exciting, relevant and meaningful. Television and projector are viewed as the most used technology (Hansson, 2006). Some teachers are conservative expressing their belief that the use of technology in the classroom is destructive. The technocrats suggest trial and evaluation, the moderate reformists express hope for some positive outcomes and the radical revolutionaries expect a fundamental change for good (Hansson).

Television in Elementary Dental Health Education

Children are one of society's most vulnerable and most valuable populations. For a continuation of a healthy and intelligent society, helping children achieve good health is crucial (Florida Department of Health, 2007).

Dental caries is one of the leading causes of absenteeism for children (Jackson et al., 2007). Dental disease is considered a silent epidemic affecting millions of children and adults, and since it is silent in nature, most people delay treatment until the severity is exacerbating (Health Policy Institute of Ohio, 2005). Despite of its high prevalence, dental caries is preventable (Florida Department of Health) and dental health education has a positive impact towards reducing dental disease (California Dental Hygienists' Association [cdha], n.d.). Habits

we learn as children related to diet and oral hygiene last all our lives, that is why it is important to receive such education at an early age (Vanobbergen, Declerck, Mwalili, & Martens, 2004). Economically disadvantaged children are twice as likely as their peers to have dental problems and a few receive proper treatment (1-800-DENTIST, n.d.).

Television can reach a large group of people at one time and convey information regardless of the viewer's ability to read (Discovery Channel Global Education Partnership, n.d.). Television can be an essential tool in promoting health actions and a possible vehicle for oral health promotion and prevention (Friel, Hope, Kelleher, Comer, & Sadlier, 2002). Interactive technology could make the learning of oral health fundamentals fun (American Dental Association [ADA], 1995-2009) as well as using activities like games, puzzles, coloring pages and crafts (Haddal, 2008).

Positively influencing the knowledge, attitudes and behaviors toward sustainable proper oral health requires combining the school based programs with mass media, community and individual interactions (Friel et al., 2002). On its own a dental television campaign was found to increase knowledge and reinforce attitudes, but without sustained understanding and behavior effects (Friel et al.).

In national television campaigns short term effects of improved health behaviors were reported (Sixsmith, Kelleher, & Crangle, 2000). This was improved when teaching by health professionals was combined with the mass media campaigns. (McGovern et al., 1997). It is generally believed that mass media programs alone are unlikely to achieve sustained behavior change (Tones, 2000).

There is an abundance of oral health care television advertisements, products and merchandizing from the commercial sector that children can get into contact each day, but there

seems to be an absence of public health studies, including those related to oral care and their effectiveness on children's knowledge, attitudes and behaviors (Sebel, 1996).

Most school based dental education promotion programs have no longitudinal studies of reinforcement or assessment (Sebel).Research in dental health education and promotion needs to improve in finding strategies to improve the health of community (Brown, 1994). Insufficient research has been conducted regarding the effectiveness of educational television in general and dental health promotion for children (Carney, 2006).

Dental Health Education in Elementary Schools in Romania

The level of dental education in elementary schools in Romania is substandard and a development of a preventive program is needed to improve the dental health of school aged children (Indrei & Carausu, 2005). In the post communist transition period, the economic instability contributed to decline in children nutritional status (UNICEF Romania) to health inequalities and to a general deterioration in overall health. This created a need to intervene at an early age to promote wellness (Baban, Craciun, Balazsi, Ghenea, & Olsavszky, 2008) and good oral health practices to ensure positive long term dental health and hygiene (Friel et al., 2002).

Elementary school teachers have a great potential for influencing dental health attitudes, knowledge and behaviors of their students. Children spend considerable time in the schools and can be reached at a time when their health habits are still being formed (Gomaa, 1997). A goal of school based program would be integration of oral health education into the curriculum (Hanganu et al., 2004).Schools traditionally accepted the responsibility of teaching dental health, but the programs were episodic and lacked depth (Hanganu et al., 2004).

Teachers cannot be expected to possess expertise about preventive dental health promotion and treatment and there is little research in Romania on what would constitute an optimal oral health educational program in the classroom (Gomaa, 1997).

According to the literature, no research has been conducted in Romania in the area of using oral health television-based instructional programs for elementary school- aged children and their influence on attitudes, knowledge and behaviors.

Chapter III: Methodology

Introduction

Romanian elementary school aged children have had a considerable problem with their oral health. They have poor oral health compared to western standards and do not receive satisfactory oral hygiene education at school, home or dental office. The purpose of this study was to assess the use of an audio-visual instructional program as a tool to teach preventive oral hygiene concepts and methods to third grade students in their classroom. This research was designed to measure what effect, if any, the audio-visual instructional program had on the student's knowledge, attitudes, and behaviors in oral hygiene. Two groups of students were used in the study, the experimental group and control group. The experimental group viewed the audio-visual instructional program and the control group did not.

The student's current knowledge level and current attitudes on preventive oral hygiene were represented by the student's score on a written knowledge test and written attitude survey given prior to the experimental group of students viewing the audio-visual instructional program. Also, prior to the experimental group of students viewing the audio-visual instructional program the students' basic preventive oral hygiene behavior was represented by the students' score on a dental plaque index. A week after the experimental group of students viewed the audio-visual instructional program the same knowledge test, attitude survey and plaque index were re-administered to the experimental and control group.

The following professors and dentists served as consultants: Dr. Howard Lee, Professor, School of Education, University of Wisconsin-Stout, Menomonie, Wisconsin; Dr. Scott Patterson, Orthodontist, Monroe, Wisconsin and Dr. Laura Moldovan, Pediatric Dentist, Cluj-Napoca, Romania.

Research Design

The research was a quantitative study using a basic experimental research design to measure what effect (if any) the independent variable (an audio-video program on oral hygiene) will have on the dependent variables (attitudes, knowledge about oral hygiene, and plaque scores). The constants in the study were the subjects, all in third grade attending "Ion Creanga", Elementary School Cluj-Napoca, Romania, the school dentist who administered the tests and surveys, and the same researcher evaluated the plaque index.

The subject's current knowledge, attitude and behavior on preventive oral hygiene were represented by the subjects' score on the knowledge test, attitude survey and plaque index. The knowledge test, attitude survey and plaque index were given prior to the experimental group viewing the audio-visual instructional program. A week after viewing the audio-visual instructional program the same knowledge test, attitude survey and plaque index were re-administered to the experimental and control group. Table 1 shows the design of the study.

Table 1

Design of the Study

	Day One			Day Two	Day Seven		
Group	Knowledge Test	Attitude Survey	Plaque Index	Audio-Visual Instructional Program	Knowledge Test	Attitude Survey	Plaque Index
Control	X	X	X	Did not view	X	X	X
Experimental	X	X	X	Viewed	X	X	X

On day one, the experimental and control groups were given the same knowledge test to determine the knowledge level, prior to the experimental group viewing the audio-visual

instructional program. The knowledge test was a written test consisting of ten multiple choice questions. Also, both groups were given the attitude survey to determine their attitudes towards oral hygiene prior to the experimental group viewing the audio-visual instructional program. The attitude survey was a written survey consisting of ten multiple choice questions. Afterwards, both groups had the dental plaque index evaluated to determine their oral hygiene behavior, prior to the experimental group viewing the audio-visual instructional program.

On the second day only one group, the experimental group, was shown the audio-visual instructional program. The audio-visual instructional program was comprised of three sections. The first section was an animation "Geena's Tremendous Tooth Adventure" produced by Crest Educational Services to be used for oral health education in the schools, which presented concepts on preventive dentistry: formation of dental plaque and cavities, emphasizing the importance of taking care of the teeth by brushing, flossing, eating healthy foods and going regularly to the dentist for checkups.

The second section of the animation demonstrated the method of sulcular tooth brushing and the procedure was:

1. A child- sized soft brush was used.
2. The brush was positioned so the bristles were directed toward the tooth at a 45 degree angle to the long axis of the tooth, right at the gum line, the most significant area in the control of dental plaque formation.
3. With this placement of the brush, the bristles were pressed lightly with a circular stroke.
4. The toothbrush was moved to the adjacent tooth and the same circular stroke was repeated.

5. The surfaces of all teeth were brushed, inside and outside, except the inside surfaces of the front teeth.
6. For the inside surfaces of the front teeth, the toothbrush was held parallel to the long axis of the teeth, with the bristles below the gum.
7. Keeping this placement of the toothbrush, the bristles were pressed lightly with a circular stroke.

The third section demonstrated the dental flossing technique. The procedure was:

1. A 30-36 cm length of floss was torn from the dispenser.
2. The floss was wrapped around the middle fingers on each hand.
3. The floss was grasped with the thumb and index fingers, leaving a 2-4 cm area between the fingers.
4. A gentle sawing motion was used to work the floss between the teeth.
5. The floss was pressed firmly against the tooth and slid under the gum keeping the floss in contact with the tooth.
6. The floss was slid up and down five times then without removing the floss the adjacent tooth was done. The motion was repeated for all the teeth.

One week after the experimental group viewed the audio-visual instructional program the school dentist re-administered to both groups the same knowledge test followed by the same attitude survey and then the researcher re-administered the plaque index.

Selection of the Sample

The subjects consisted of 40 randomly selected students at third grade level, between the ages of 8 and 9, from one elementary school "Ion Creanga", Cluj-Napoca, Romania, which had a total of 150 third grade students. Each subject was chosen randomly and entirely by chance, such

that each individual had the same probability of being chosen at any stage during the sampling process, and each subset of 20 subjects had the same probability of being chosen for the sample as any other subset of 20 individuals. The experimental and control group each consisted of 20 subjects (10 male, 10 female) on purpose and a randomization was conducted to determine which group would serve as the experimental group and view the preventive dentistry audio-visual instructional program.

The following information is an overview of the characteristics of the sample population:

a. A child who was between the ages of 8 and 9 and was presently attending the 3rd grade.
b. A child who had a mixed dentition that included fully erupted permanent first molars and central incisors, in the maxillary and mandibular arch, which is typically a standard for this age level.
c. The experimental and control groups each consisted of 10 females and 10 males.

Instrumentation

Three instruments were used to collect data for the study, the knowledge test, attitude survey, and plaque index. The instrument used to assess the preventive dental knowledge of the experimental and control group consisted of ten multiple choice questions (Appendix A). Each question was scored one point for each correct response. The highest score would be 10, for ten correct answers and the lowest score being 0 for no correct answers. This method was selected to gather information to determine what the experimental and control groups previously acquired level of dental knowledge was. The ten knowledge questions were generated from the concepts presented in the audio-visual instructional program: formation of dental plaque and cavities, emphasizing the importance of taking care of the teeth by brushing, flossing, eating healthy

foods and going regularly to the dentist for checkups. The knowledge test used ten multiple choice questions that were developed and revised by the researcher, and validated by the previously noted consultants. Following the completion of the study the knowledge mean scores of each group were compared against each other to find if they were significantly different from one another, by computing the t-test statistics.

The instrument used to obtain the experimental and control group's attitudes on preventive dentistry consisted of a written survey with ten multiple choice questions, using the Likert rating scale (Appendix B). The survey questions were developed and revised by the researcher, and validated by the previously noted consultants. This method was selected to determine the previously existing attitudes of the experimental and control group concerning concepts presented in the audio-visual instructional program: formation of dental plaque and cavities, emphasizing the importance of taking care of the teeth by brushing, flossing, eating healthy foods and going regularly to the dentist for checkups. The Likert scale for scoring the survey was selected since it is commonly used in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement. The 3-point Likert scale was selected as being appropriate for students at third grade level. The scale uses three choices: "like", "don't know" and "dislike." The choices were rated as follows: 3 points for "like", 2 points for "don't know" and 1 point for "dislike." The mean attitude scores of each group were compared against each other to find if they were significantly different from one another, by computing the t-test statistics.

The experimental group and control group each had Cocarla modification of the Simplified Oral Hygiene Plaque Index performed. The plaque index was used to determine the oral hygiene behavior of the subjects by scoring the amount of plaque found to be present on six

of their teeth. Methylene Blue dental plaque disclosing solution was used to color the outside surfaces of teeth. The procedure criteria and scoring according to Cocarla (2000) follows:

A. Procedure

1. A cotton swab saturated with Methylene Blue was dabbed onto the facial (outside) surfaces of teeth.
2. The subject was instructed to take a sip of water, swish and expectorate.
3. Direct vision or indirect vision with a dental mirror was used to identify the dental plaque on the surfaces of the teeth according to the following criteria.

B. Criteria

0= No plaque present.

1= Plaque at the gingival margin covering 1/3 of the gingival third of the tooth surface.

2= Plaque covering ½ or less of the tooth surface.

3= Plaque covering more than a ½ of the tooth surface.

C. Scoring (p.185)

The scores of all six teeth (two maxillary first permanent molars and one central incisor, and two mandibular first permanent molars and one central incisor) are all added together. The value of the index between 0 and 4 demonstrates good oral hygiene, value between 4 and 6 demonstrates fair oral hygiene, over 6, poor oral hygiene. The maximum value of the index is 18, which demonstrates disastrous oral hygiene.

Pilot Study

A pilot study was conducted to assess the reliability of the knowledge and attitude instruments. The subjects consisted of eight randomly selected students at third grade level, between the ages of 8 and 9, from a different elementary school in urban Romania. Each subject was chosen randomly and entirely by chance, such that each subject had the same probability of being chosen at any stage during the sampling process, and each subset of eight subjects had the same probability of being chosen for the sample as any other subset of eight subjects. The pilot study group was given the pre-tests and then viewed the audio-visual instructional program and a week later was given the post-tests. The reliability of the knowledge test and attitude test was assessed based on the pre-test and post-test scores.

Knowledge Test

Table 2

Knowledge Scores

	Pilot Group	
	Pre-Test Score	Post-Test Score
	5	4
	3	2
	4	5
	5	3
	6	1
	5	4
	3	3
	6	2
Total	37	24
Mean	4.625	3.0
Standard Deviation	1.18	1.30

Table 2 includes individual scores, the total group sum scores, the mean and standard deviation.

The mean for the pilot group knowledge pre-test was 4.625 (1.18 SD). The post-test mean was 3 (1.30 SD). Was there a significant difference in the knowledge mean scores between the pre-test and post-test evaluation? To answer this question the knowledge mean scores were analyzed using the t-test statistics and the results were given in Table 3.

Table 3

T-Test of Pre-Test and Post-Test Knowledge Means

	$Mean_A$ - $Mean_B$	t	df
	1.625	+2.6	14
P	One-tailed	0.0104885	
	Two-tailed	0.020977	

After computing the results, it was verified whether the t value of ± 2.6 was significant for 16 observations. Thus, according to the t significance/ probability table for df = 14, where df = N - 2, N - total number of observations, t reaches $p < .05$, thus the difference between the two sample observations is statistically significant and it could be concluded that the knowledge test was reliable.

Attitude Test

Table 4

Attitude Scores

	Pilot Group	
	Pre-Test Score	Post-Test Score
	19	15
	20	17
	21	16
	19	13
	24	17
	17	19
	20	22
	23	20
Total	163	139
Mean	20.375	17.375
Standard Deviation	2.26	2.87

Table 4 includes individual scores, the total group sum scores, the mean and standard deviation.

The mean for the pilot group attitude pre-test was 20.375 (2.26 SD). The post-test mean was 17.375 (2.87 SD). Was there a significant difference in the attitude mean scores between the pre-test and post-test evaluation? To answer this question the attitude mean scores were analyzed using the t-test statistics and the results were given in Table 5.

Table 5

T-Test of Pre-Test and Post-Test Attitude Means

$Mean_A$ - $Mean_B$		t	df
3		+2.32	14
P	One-tailed	0.0179795	
	Two-tailed	0.035959	

After computing the results, it was verified whether the t value of ± 2.32 was significant for 16 observations. Thus, according to the t significance/ probability table for df = 14, where df = N - 2, N - total number of observations, t reaches $p < .05$,thus the difference between the two sample observations is statistically significant and it could be concluded that the attitude test was reliable.

Protection of Human Subjects in Research

In accordance with the United States Department of Health and Human Services regulations the University of Wisconsin-Stout Institutional Review Board reviewed and approved this pilot study. In addition, the appropriate methods for obtaining informed consent were utilized (Appendix C). The consent form explained the procedures involved in the study, the benefits and potential risks. It outlined the confidentiality, the right to withdrawal, and the statement of consent.

Chapter IV: Findings

Introduction

A significant problem in Romanian elementary schools is that many children have poor oral health and do not receive satisfactory oral hygiene education at school, home or dental office. The purpose of this study was to assess the use of an audio-visual instructional program as a tool to teach preventive oral hygiene concepts and methods to third grade students in their classroom. This was a quantitative study using a basic experimental research design to measure what effect, if any, the audio-visual instructional program on preventive oral hygiene concepts and methods had on the student's knowledge, attitudes, and behavior in oral hygiene.

The student's current knowledge level and current attitudes on preventive oral hygiene were represented by the student's score on a written knowledge test and written attitude survey given prior to the experimental group of students viewing the audio-visual instructional program. Also, prior to the students viewing the audio-visual instructional program the student's basic preventive oral hygiene behavior was represented by student's score on a plaque index. A week after the experimental group of students viewed the audio-visual instructional program the same knowledge test, attitude survey and plaque index were administered again to the experimental and control group.

The knowledge test consisted of ten multiple choice questions (Appendix A) and was designed to assess the basic preventive oral hygiene knowledge (the formation of dental plaque and cavities, the importance of brushing and flossing your teeth, eating health foods, and going regularly to the dentist for checkups) which was covered in the audio-visual instructional program.

The attitude survey was designed to assess the student's attitude toward basic preventive oral hygiene. The survey consisted of ten multiple choice questions using the Likert rating scale (Appendix B).

The student's basic preventive oral hygiene behavior was assessed by examining six teeth for the presence of plaque using the Cocarla modification of the Simplified Oral Hygiene Plaque Index.

The Sample

The subjects used for this study were third grade elementary school children, age 8 to 9 years old. A total of 40 students were randomly selected for the study, with 20 in the control group and 20 in the experimental group, with each group consisting of 10 girls and 10 boys. A randomization was conducted to determine which group would serve as the experimental group and view the educational audio-visual instructional program video. The control group did not view the educational audio-visual instructional program video. All subjects were selected from "Ion Creanga" school, Cluj-Napoca, Romania, and had the same school dentist proctor the test and administer the educational audio-visual instructional program video.

Knowledge

The first question this study addressed was to identify if there was a significant difference in current knowledge of preventive oral hygiene between the experimental group and the control group prior to the experimental group viewing the educational audio-visual instructional program. The instrument used to assess the current knowledge of preventive oral hygiene was a multiple choice test. The test, consisting of ten multiple choice questions (Appendix A) was explained with a brief overview of how to answer the test questions. The test was administered by the school dentist and collected. The next day the experimental group viewed the audio-visual

instructional program in class. The program consisted of a ten minute animation video discussing the formation of dental plaque and cavities, emphasizing the importance of taking care of the teeth by brushing, flossing, eating healthy foods and going regularly to the dentist for checkups. A week later the same written ten question knowledge test was administered to both groups by the school dentist and collected. The results of the knowledge test were reported in Table 6.

Table 6

Knowledge Test Scores, Mean and Standard Deviation

	Experimental Group		Control Group	
	Pre-Test Score	Post-Test Score	Pre-Test Score	Post-Test Score
	0	8	6	6
	4	7	5	5
	7	9	3	5
	6	9	8	8
	4	8	4	4
	9	10	8	8
	1	6	6	7
	4	6	7	7
	1	4	3	5
	5	7	2	4
	9	10	8	8
	8	10	3	4
	6	9	4	4
	6	8	5	6
	7	8	8	9
	8	10	7	7
	3	8	6	7
	5	8	5	7
	9	10	4	6
	5	8	7	8
Total	107	163	109	125
Mean	5.35	8.15	5.45	6.25
Standard Dev.	2.70	1.59	1.93	1.58

Table 6 includes individual scores, the total group sum scores, the mean and standard deviation.

The mean for the experimental group pre-test was 5.35 (2.70 SD) and 5.45 (1.93 SD) for the control group. One student in the experimental pre-test had a low score of zero and three students had a high score of nine. In the control pre-test, one student had a low score of two and four students had a high score of eight.

The experimental post-test mean was 8.15 (1.59 SD) and the control post-test mean was 6.25 (1.58 SD). Five students had a high score of 10 in the experimental post-test and one student had a low score of four. In the control post-test, one student had a high score of nine and four had a low score of four.

Assessment of Pre-Test Difference in Knowledge

Was there a significant difference in the knowledge mean scores between the experimental group and the control group before the experimental group viewed the audio-visual instructional program? To answer this question the knowledge mean scores were analyzed using the t-test Statistics and the results were given in Table 7.

Table 7

T-Test of Pre-Test Means

	$Mean_A$ - $Mean_B$	t	df
	-0.1	-0.13	38
P	One-tailed	0.448626	
	Two-tailed	0.897252	

After computing the results, it was verified whether the t value of ± 0.13 was significant for a population of 20 students. In the case of significance level 0.05 (i.e. there is a probability of 5% to be wrong), the t value should be greater than 2.02 in order to have a significant difference

between the two groups of students. Hence, it was concluded that there was not a significant difference in the knowledge mean scores between the two pre-test groups.

Assessment of Post-Test Difference in Knowledge

Was there a significant difference in the knowledge mean scores between the experimental group and the control group after the experimental group viewed the audio-visual instructional video program? To answer this question the knowledge mean scores were analyzed using the t-test Statistics and the results were given in Table 8.

Table 8

T-Test of Post-Test Means

	$Mean_A$ - $Mean_B$	t	df
	1.9	+3.77	38
P	One-tailed	0.0002775	
	Two-tailed	0.000555	

After computing the results, it was verified whether the t value of ± 3.77 was significant for a population of 20 students. It was determined that the t value of 3.77 was greater than 2.02, hence it was concluded that there was a significant difference in the knowledge means scores between the two post-test groups of students.

Assessment of Pre-Test Knowledge vs. Post-Test Knowledge of the Experimental Group

Was there a significant difference in the experimental group's pre-test knowledge mean and post-test knowledge mean? To answer this question the mean scores were analyzed using the t-test statistics and the results were given in Table 9.

Table 9

T-Test of Pre-Test and Post-Test Means of Experimental Group

	$Mean_A$ - $Mean_B$	t	df
	-2.8	-3.99	38
P	One-tailed	0.0001455	
	Two-tailed	0.000291	

After computing the results, it was verified whether the t value of ± 3.99 was significant for a population of 20 students. There was a significant difference in the mean scores between the experimental group pre-test and post-test, since the value of t of ± 3.99 was greater than the critical value of t= 2.02.

Attitude

The instrument used to assess the current attitudes on preventive oral hygiene was a written multiple choice survey (Appendix B). The survey, consisting of ten multiple choice questions was explained with a brief overview of how to answer the questions. The survey was administered by the school dentist and collected. The next day the experimental group viewed the audio-visual instructional program in class. A week later the same ten question attitude survey was administered to both groups by the school dentist and collected.

The results of the attitude survey were reported in Table 10 and include individual scores, total group sum scores, the mean and standard deviation.

Table 10

Attitude Survey Scores, Mean and Standard Deviation

	Experimental Group		Control Group	
	Pre-Test Score	Post-Test Score	Pre-Test Score	Post-Test Score
	10	17	11	11
	12	18	13	17
	15	19	16	20
	19	19	18	18
	22	24	21	25
	18	19	18	24
	19	20	17	17
	25	23	24	20
	13	14	14	12
	20	20	21	19
	18	17	17	10
	14	15	16	15
	15	18	15	14
	18	18	10	12
	19	19	20	20
	16	16	18	15
	20	22	20	20
	21	22	21	22
	14	26	10	12
	13	20	12	14
Total	341	386	332	337
Mean	17.05	19.30	16.60	16.85
Standard Dev.	3.77	2.99	4.00	4.38

The mean for the experimental group pre-survey was 17.05 (3.77 SD) and 16.60 (4.00 SD) for the control group. One student in the experimental pre-survey had a low score of ten and one student had a high score of twenty five. In the control pre-survey, two students had a low score of ten and one student had a high score of twenty four.

The experimental post-survey mean was 19.30 (2.99SD) and the control post-survey mean was 16.85 (4.38 SD). One student had a high score of 26 in the experimental post-survey and one student had a low score of 14. In the control post-survey, one student had a high score of 25 and one had a low score of 10.

Assessment of Pre-Survey Difference in Attitude

Was there a significant difference in the mean attitude scores between the experimental group and the control group before the experimental group viewed the audio-visual instructional program? To answer this question the mean scores were analyzed using the t-test statistics and reported in Table 11.

Table 11

T-Test of Pre-Survey Means

	$Mean_A$ - $Mean_B$	t	df
	0.45	-0.37	38
P	One-tailed	0.3567185	
	Two-tailed	0.713437	

After computing the results, it was verified whether the t value of ± 0.37 was significant for a population of 20 students. In the case of significance level 0.05 (i.e. there is a probability of 5% to be wrong), the t value should be greater than 2.02 in order to have a significant difference between the two groups of students. Hence, it was concluded that there was not a significant difference in the attitude mean scores between the two pre-survey groups.

Assessment of Post-Survey Difference in Attitude

Was there a significant difference in the mean attitude scores between the experimental group and the control group after the experimental group viewed the audio-visual instructional program? To answer this question the mean scores were analyzed using the t-test statistics and the results reported in Table 12.

Table 12

T-Test of Post-Survey Means

	$Mean_A$ - $Mean_B$	t	df
	2.45	+2.04	38
P	One-tailed	0.0226495	
	Two-tailed	0.045299	

After computing the results, it was verified whether the t value of ± 2.04 was significant for a population of 20 students. It was determined that the t value of 2.04 was greater than 2.02, hence it was concluded that there was a significant difference in the mean attitude scores between the two post-survey groups of students.

Assessment of Pre-Survey Attitudes and Post-Survey Attitudes of the Experimental Group

Was there a significant difference in the experimental group's pre-survey mean and post-survey mean? To answer this question the mean scores were analyzed using the t-test statistics and the results reported in Table 13.

Table 13

T-Test of Pre-Survey and Post-Survey Means of the Experimental Group

	$Mean_A$ - $Mean_B$	t	df
	-2.25	-2.09	38
P	One-tailed	0.021681	
	Two-tailed	0.043362	

After computing the results, it was verified whether the t value of ± 2.09 was significant for a population of 20 students. There was a significant difference in the attitude mean scores between the experimental group pre-survey and post-survey, since the value of t of ± 2.09 was greater than the critical value of t= 2.02.

Behavior

The student's basic preventive oral hygiene behavior was assessed by examining teeth for the presence of plaque using the Cocarla modification of the Simplified Oral Hygiene Plaque Index. The plaque index was conducted on both groups before the experimental group viewed the audio-visual instructional program.

The next day the experimental group viewed the audio-visual instructional program. A week later the same plaque index was administered to both groups by the researcher and the scores were recorded. The results of the plaque scores were reported in Table 14.

Table 14

Plaque Scores, Mean and Standard Deviation

	Experimental Group		Control Group	
	Pre-Test Score	Post-Test Score	Pre-Test Score	Post-Test Score
	18	16	18	18
	8	8	14	14
	18	17	10	12
	15	15	14	14
	14	8	8	8
	12	8	8	10
	16	12	10	10
	10	10	12	14
	6	4	6	6
	12	8	15	18
	18	10	12	10
	10	8	10	8
	14	14	14	14
	10	6	18	18
	13	10	18	16
	14	14	14	12
	15	12	12	14
	16	14	12	12
	10	10	8	8
	12	8	12	12
Total	261	212	245	248
Mean	13.05	10.60	12.25	12.40
Standard Dev.	3.37	3.51	3.46	3.53

Table 14 includes the individual plaque scores, total group sum scores, the means and standard deviations. The mean plaque score for the experimental group pre-index was 13.05 (3.37 SD) and 12.25 (3.46 SD) for the control group. In the pre-index scoring, the experimental and control group each had students with similar high and low scores, each had three students with a high score of eighteen and one student with a low score of six.

The experimental post-index plaque mean was 10.60 (3.51 SD) and the control post-index plaque mean was 12.40 (3.53 SD). One student had a high score of sixteen in the experimental post-index and one student had a low score of four. In the control post-index, three

students had a high score of 18 and one had a low score of six, which was the same result as the pre-index.

Assessment of Plaque Scores Pre-Viewing the Audio-Visual Instructional Program

Was there a significant difference in the mean plaque scores between the experimental group and the control group before the experimental group viewed the audio-visual instructional program? To answer this question the mean scores were analyzed using the t-test statistics and the results reported in Table 15.

Table 15

T-Test of Pre-index Means

	$Mean_A$ - $Mean_B$	t	df
	0.8	+0.74	38
P	One-tailed	0.231924	
	Two-tailed	0.463848	

After computing the results, it was verified whether the t value of ± 0.74 was significant for a population of 20 students. In the case of significance level 0.05 (i.e. there is a probability of 5% to be wrong); the t value should be greater than 2.02 in order to have a significant difference between the two groups of students. Hence, there was not a significant difference in the mean plaque scores between the two groups prior to the experimental group viewing the audio-visual instructional program.

Assessment of Plaque Scores Post-Viewing the Audio-Visual Instructional Program

Was there a significant difference in the mean plaque scores between the experimental group and the control group after the experimental group viewed the audio-visual instructional

video program? To answer this question the mean scores were analyzed using the t-test statistics and the results reported in Table 16.

Table 16

T-Test of Post-index Means

	$Mean_A$ - $Mean_B$	t	df
	-1.8	-1.62	38
P	One-tailed	0.0567515	
	Two-tailed	0.113503	

After computing the results, it was verified whether the t value of ± 1.62 was significant for a population of 20 students. It was determined that the t value of 1.62 was not greater than 2.02; hence there was not a significant difference in the mean plaque scores between the two groups of students.

Assessment of Pre-Viewing Plaque Scores and Post-Viewing Plaque Scores of the Experimental Group

Was there a significant difference in the experimental group's pre-viewing plaque mean and post-viewing plaque mean? To answer this question the mean scores were analyzed using the t-test statistics and the results reported in Table 17.

Table 17

T-Test of Pre-index and Post-index Means of the Experimental Group

	$Mean_A$ - $Mean_B$	t	df
	2.45	+2.25	38
P	One-tailed	0.01516	
	Two-tailed	0.030320	

After computing the results, it was verified whether the t value of ± 2.25 was significant for a population of 20 students. There is a significant difference in the mean plaque scores between the experimental group pre-viewing and post-viewing, since the t value of ± 2.25 was greater than the critical value of t= 2.02.

Chapter V: Summary, Conclusions and Recommendations

Summary

A significant problem in Romanian elementary schools is that many children have poor oral health and do not receive satisfactory oral hygiene education at school, home or dental office, therefore the prevalence of dental caries and tooth loss in Romanian children has remained high. Most children do not visit the dentist for preventive purposes, but only emergencies, like dental pain or oral infections that result in tooth loss. The purpose of this study was to assess the use of an audio-visual instructional program as a tool to teach preventive oral hygiene concepts and methods to third grade students in their classroom. Educating children toward good oral hygiene at an early age can instill the knowledge and skill to prevent oral disease in their future.

This was a quantitative study using a basic experimental research design to measure what effect (if any) the independent variable (an audio-video program on basic oral hygiene) will have on the dependent variables (attitudes, knowledge about oral hygiene, and plaque scores). The constants in the study were the 3rd grade subjects, the school, the school dentist and researcher.

The subject's current knowledge, attitude and behavior on preventive oral hygiene were represented by the subjects score on the knowledge test, attitude survey and plaque index. The knowledge test, attitude survey and plaque index were given prior to the students viewing the audio-visual instructional program. A week after viewing the audio-visual instructional program the same knowledge test, attitude survey and plaque index were re-administered.

The study consisted of 40 randomly selected 3rd graders, the experimental and control group each consisted of 20 subjects (10 male, 10 female) and a randomization was conducted to

determine which group would serve as the experimental group and view the audio- visual instructional program. The control group did not view the audio- visual instructional program.

Conclusions

Each research question will be restated and a conclusion noted.

Research Question #1: Is there a significant difference in the knowledge mean scores between the experimental group and the control group before the experimental group viewed the audio-visual instructional program? It was found that there was not a significant difference in the knowledge mean scores between the experimental group and the control group pre-test scores. The result was found from analyzing the mean scores of the knowledge test prior to viewing the audio-visual instructional program by the experimental group. The result was a t value of $\pm$ 0.13 which was less than the critical value of $t = 2.02$. Based upon the findings from the study it can be concluded that there was no difference in knowledge of preventive oral hygiene between the two groups studied prior to the viewing of the video by the experimental group. This conclusion assumes that the instrument, the knowledge test, properly assessed the knowledge level of the subject's knowledge of preventive oral hygiene.

Research Question #2: Is there a significant difference in the knowledge mean scores between the experimental group and the control group after the experimental group viewed the audio-visual instructional video program? It was found that there was a significant difference in the knowledge means scores between the experimental group and the control group, after the experimental group viewed the audio-visual instructional program. It was determined that the t value of 3.77 was greater than 2.02, hence there was a significant difference in the means scores between the two post-test groups of students. Based on the findings of the study it can be concluded that there was a difference in knowledge of preventive oral hygiene between the two

groups studied after the viewing of the video by the experimental group. Based on the findings that the experimental group scored significantly better (higher number of correct answers) on the knowledge test after viewing the audio-visual instructional video program.

Research Question #3: Is there a significant difference in the experimental group's pre-test knowledge mean and post-test knowledge mean? It was found that there was a significant difference in the experimental group's knowledge pre-test mean and knowledge post-test mean scores. There was a significant difference in the knowledge mean scores between the experimental group pre-test and post-test, since the value of t of ± 3.99 is greater than the critical value of t= 2.02. It can be concluded that the audio-visual instructional program was successful in increasing the student's knowledge of preventive oral hygiene.

Research Question #4: Is there a significant difference in the mean attitude scores between the experimental group and the control group before the experimental group viewed the audio-visual instructional program? It was found that there was not a significant difference in the attitude mean scores between the experimental group and the control group pre-survey scores. The result was found from analyzing the mean scores of the attitude survey prior to viewing the audio-visual instructional program by the experimental group. The result was a t value of ± 0.37 which was less than the critical value of t = 2.02. Based upon the findings from the study it can be concluded that there was no significant difference in the attitudes on preventive oral hygiene between the two groups studied prior to the viewing of the audio-visual instructional program by the experimental group. This conclusion assumes that the instrument, the attitude survey properly assessed the subject's attitudes on preventive oral hygiene.

Research Question #5: Is there a significant difference in the mean attitude scores between the experimental group and the control group after the experimental group viewed the audio-visual instructional program? It was found that there was a significant difference in the attitude means scores between the experimental group and the control group, after the experimental group viewed the audio-visual instructional program. It was determined that the t value of 2.04 was greater than 2.02, hence there was a significant difference in the attitude means scores between the two post-survey groups of students. Based on the findings of the study it can be concluded that there was a difference in the attitudes on preventive oral hygiene between the two groups studied after the viewing of the audio-visual instructional program by the experimental group.

Research Question #6: Is there a significant difference in the experimental group's attitude pre-survey mean and attitude post-survey mean? It was found there was a significant difference in the experimental group's attitude pre-survey mean and attitude post-survey mean scores. There was a significant difference in the attitude mean scores between the experimental group pre-survey and post-survey, since the value of t of $\pm$ 2.09 was greater than the critical value of t= 2.02. It can be concluded that the audio-visual instructional program was successful in changing the student's attitude on preventive oral hygiene.

Research Question #7: Is there a significant difference in the mean plaque scores between the experimental group and the control group before the experimental group viewed the audio-visual instructional program? It was found that there was not a significant difference in the plaque mean scores between the experimental group and the control group before the experimental group viewed the audio-visual instructional program. The result was found from analyzing the mean scores of the plaque index prior to viewing the audio-visual instructional

program by the experimental group. The result was a t value of ± 0.74 which was less than the critical value of t = 2.02. Based upon the findings from the study it can be concluded that there was no significant difference in preventive oral hygiene behavior between the two groups studied prior to the viewing of the audio-visual instructional program by the experimental group. This conclusion assumes that the instrument, the plaque index properly assessed the subject's preventive oral hygiene behavior.

Research Question #8: Is there a significant difference in the mean plaque scores between the experimental group and the control group after the experimental group viewed the audio-visual instructional video program? It was found that there was not a significant difference in the plaque means scores between the experimental group and the control group, after the experimental group viewed the audio-visual instructional program. The mean scores were analyzed using the t-test statistics. It was determined that the t value of ± 1.62 was not greater than the critical value of t= 2.02, hence there was not a significant difference in the plaque means scores between the two post-viewing groups of students. Based upon the findings from the study it can be concluded that there was no significant difference in preventive oral hygiene behavior between the two groups after viewing the audio-visual instructional program by the experimental group.

Research Question #9: Is there a significant difference in the experimental group's pre-viewing plaque mean and post-viewing plaque mean? It was found there was a significant difference in the experimental group's plaque pre-viewing mean and plaque post-viewing mean scores. There was a significant difference in the plaque mean scores before and after viewing the audio-visual instructional program, since the value of t of ± 2.25 was greater than the critical value of t= 2.02.

Recommendations

Based on the conclusions of the study it was recommended:

1. Expand this pilot study to a larger population of students from schools throughout Romania. It would be worthwhile to increase the scope of the research by studying a larger sample of Romanian elementary school aged children. The study would benefit from a larger population and from a greater diversity of children from different regions of the country. Preventive oral hygiene education in elementary schools is necessary throughout Romania.
2. Expand the range of age levels included in the study. Poor oral health is a problem for all elementary school aged children in Romania not just third graders. Studying a range of ages would have a significant importance in evaluating the response to the audio-visual instructional program and would help to improve the teaching strategy.
3. The conclusions of this pilot study may be used as support for encouraging the use of audio-visual oral health instructional material in the classroom. Considering the necessity of increased oral health instruction in the classroom, this study could be a valuable asset for elementary school educators.
4. In future studies another dental plaque index may be used for the evaluation of plaque on the surfaces of teeth. There are several different plaque indexes that could be used to measure the quantity and the location of dental plaque.
5. Allow the children to practice the correct brushing and flossing techniques following the viewing of the audio-visual instructional program. More time could be allotted for the children to review the material that was covered in the audio-visual instructional program, immediately after viewing the material. The children could be allowed to

practice what they learned, proper brushing and flossing techniques, to reinforce their learning.

6. Include different animations in the audio-visual instructional program. Expanding the range of age level, several age appropriate animations could be incorporated in the instructional program. Also, having two different animation stories, covering the same basic oral health concepts, could reinforce the children's learning.
7. The findings of this study could be shared with school administrators in Romania. Since all children attend school, the logical choice of venue is to conduct oral health instruction in the classroom in an affordable, efficient and effective way.

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Appendix A

Instrument Utilized for Knowledge Data Collection

Knowledge Test

Please circle only one answer for each of the following questions. Please ask for help if you do not understand the question.

1. I should brush my teeth.....
   A. Every day
   B. Once a week
   C. Once a month

2. I should floss my teeth .....
   A. Every day
   B. Once a week
   C. Once a month

3. Dental plaque .....
   A. Makes my smile beautiful
   B. Is a buildup of germs on my teeth
   C. Keeps my teeth from falling

4. Candy and sweets.....
   A. Are healthy foods
   B. Cause cavities
   C. Are good for my teeth

5. Why should I go to the dentist.....
   A. To have my teeth checked
   B. To have my eyes checked
   C. To have my ears checked

6. I should brush my teeth .....
   A. In the front only
   B. Across the tops only
   C. In the front, across the tops and on the inside

7. Fruits and vegetables.....
   A. Cause cavities
   B. Break my teeth
   C. Are good for my teeth

8. Cavities in my teeth.....
   A. Make my teeth strong
   B. Break down my teeth
   C. Cause no harm

9. I need the following things to take care of my teeth.....
   A. Toothbrush only
   B. Toothbrush, toothpaste , floss
   C. Floss only

10. My baby teeth .....
   A. Are replaced by permanent teeth
   B. Are replaced by new baby teeth
   C. Are not replaced

Appendix B

Instrument Utilized for Attitude Data Collection

Attitude Survey

Please circle only one answer for each of the following questions. Please ask for help if you do not understand the question.

1. How do you feel about brushing your teeth?

   A. Like 

   B. Don't know 

   C. Dislike 

2. How do you feel about flossing your teeth?

   A. Like 

   B. Don't know 

   C. Dislike 

3. How do you feel about going to the dentist for a dental check up?

   A. Like 

   B. Don't know 

   C. Dislike 

4. How do you feel about having your teeth cleaned in the dental office?

   A. Like 

   B. Don't know 

   C. Dislike 

5. How do you feel about eating fruits and vegetables?

   A. Like 

   B. Don't know 

   C. Dislike 

6. How do you feel about being told to brush your teeth?

   A. Like 

   B. Don't know 

   C. Dislike 

7. How do you feel about having your parents help you floss your teeth?

   A. Like 

   B. Don't know 

   C. Dislike 

8. How do you feel about losing the baby teeth?

   A. Like 

   B. Don't know 

   C. Dislike 

9. How do you feel about learning how to brush and floss your teeth in school?

   A. Like 

   B. Don't know 

   C. Dislike 

10. How do you feel about having the dentist fix your cavities?

A. Like 

B. Don't know 

C. Dislike 

Appendix C

Informed Consent Form

STOUT

152 Voc Rehab Building

University of Wisconsin-Stout
P.O. Box 790
Menomonie, WI 54751-0790

715/232-1126
715/232-1749 (fax)
http://www.uwstout.edu/rs/

UW-Stout Signed Consent Form for Research Involving Human Subjects

Title: *The Effects of the Preventive Dentistry Audio-Visual Instructional Program on the Knowledge, Attitude and Behavior of Elementary School Aged Children in Romania*

Investigator: Dr. Adina Ness
510 Montesian Ct.
Monticello, WI 53570
e-mail address: nessa@uwstout.edu
Phone number: (608) 938-1396

Research Sponsor: Dr. Howard Lee
Professor
School of Education
225A Applied Arts Bldg
UW-Stout, P. O. Box 790
Menomonie, WI 54751

Description:

This research study is being conducted by Dr. Adina Ness in collaboration with Dr. Laura Moldovan, the school dentist for Scoala Generala " Ion Creanga". The following research project is being conducted to meet the requirements for obtaining a Master of Science degree from the University of Wisconsin, U.S.A. and to find ways to improve the oral health education in the school.

The study will include 40 subjects at third grade level meeting the following criteria: no allergies or adverse reactions to Methylene Blue, the dental plaque disclosing solution and subjects that have not been using antibiotics for the last two weeks, since dental microbial plaque is destroyed by antibiotics. The subjects will be divided into two groups of 20 (10 girls and 10 boys) and randomly one group will be selected to view the audio- visual instructional program.

Both groups will be given a written attitude and knowledge survey and will have a dental plaque score determined. The dental plaque score will be determined by means of Methylene Blue, already used as part of the routine dental exam performed at the school dental office, swabbed on the outside surfaces of the teeth with a cotton applicator. Using direct vision and/or a dental mirror the amount of plaque present on 6 selected teeth will be recorded.

As one group will watch the Audio-Visual Instructional Program, an animated video of preventive oral hygiene, the other group will be involved in the regular school schedule. A week later both groups will repeat the attitude and knowledge survey, and will have the dental plaque score reassessed on the same 6 teeth previously scored. A decrease in the plaque score value would represent an increase in oral hygiene behavior of the children.

The use of Methylene Blue to disclose the microbial plaque present on the teeth is a routine procedure performed by the school dentist, during the annual exam performed for the children in the school, to evaluate the oral hygiene level. The only difference between participation in this study and the care the children receive as part of the routine exam in the school dental office is the inclusion of the animated video for teaching purposes and the evaluation of the plaque scores, attitudes and knowledge one week following the viewing of the animation.

Risks and Benefits:
The subjects will understand the level of their oral hygiene by visualizing the dental plaque present on their teeth. Educating children toward good oral hygiene habits at an early age will prevent oral diseases in the future. Since the school dentist has been looking for ways to improve the oral health education in the school, the objective of the study is to determine if audio- visual instruction of preventive oral hygiene could improve the dental knowledge, attitudes and behavior of the elementary school aged children.

One potential risk could be a local allergic reaction to Methylene Blue, the dental plaque disclosing solution, not more than a localized increased redness of the gum that subsides on its own without any consequences. Medical and dental histories of the participants will be evaluated prior to the study and only those subjects would participate where Methylene Blue has been used previously and there have been no reactions to it.

Special Populations:
The subjects included in the study are 40 children at third grade level, between 8 and 9 years old who have had no reaction to the use of Methylene Blue in the mouth. Also, since dental microbial plaque is destroyed by antibiotics, only those subjects will be included in the study that have not been using antibiotics for the last two weeks.

Time Commitment:
The examination of the plaque scores will take approximately 5 to 10 minutes to complete. The attitude and knowledge survey will take about 30 minutes and the viewing of the audio- visual instructional program, about 10 minutes. There will be no compensation for the subjects' time and effort.

Confidentiality:
The research study will be performed in collaboration with the school dentist, in the "Ion Creanga" school dental office. The dentist will evaluate the medical and dental histories, prior to the measurement of the plaque scores by the investigator and are kept confidential in the school dental office. For the research, the subjects' names will not be used; subjects will be assigned numbers and will only be identified in group format. This informed consent will not be kept with any of the other documents for this project.

Right to Withdraw:
Your child participation in this study is entirely voluntary. You may choose not to have your child participate, without any adverse consequences to your child. Should you choose to participate and later wish to withdraw from the study, you may discontinue your participation at that time without

incurring adverse consequences. Should you choose to withdraw please call the school dentist, Dr. Laura Moldova at 0749-211074.

IRB Approval:
This study has been reviewed and approved by The University of Wisconsin-Stout's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study please contact the School Dentist, Investigator or Advisor. If you have questions, concerns, or reports regarding your rights as a research subject, please contact the IRB administrator at the below email address.

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Cabinet Stomatologic
Phone 0749-211074

Statement of Consent:
By signing this consent form you agree to allow your child to participate in the project entitled, "The Effects of the Preventive Dentistry Audio-Visual Program on the Attitudes, Behaviors and Knowledge of School Aged Children in Romania". You are unaware of any reaction to the use of Methylene Blue and your child has not been using antibiotics for the last two weeks.

Signature _____ Date_____
Parent/Guardian

Signature _____ Date_____
Please Print Full Name