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Technology utilization model to promote health literacy in the learning resource center for the elderly

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Abstract

This research aims to develop the technology utilization model to promote health literacy in the learning resource center for the elderly. The research was divided into two phases. The first phase began with studying the needs for a technology utilization model to promote health literacy. This involved six experts and 434 elderly people in Bangkok, Thailand, and its vicinities. A technology utilization model was developed to promote health literacy, which was assessed by seven experts. The second phase involved studying the results of using the technology utilization model to promote health literacy among the 20 samples that used the model. Research instruments were questionnaires, assessment tools, and evaluation form. The research results showed that the technology utilization model to promote health literacy in the learning resource center for the elderly consisted of seven components: the target group, objectives, management, place, contents, technological education media, and assessment tools, which comprised three procedures consisting of: the preparation and planning for learning, activities organization, and evaluation. Seven experts assessed the model at the *high suitability* level (x = 4.46). The results revealed higher average scores on the post-test than on the pre-tests among the elderly who used the technology utilization model at the level of significance of .05. The result of evaluating the success of learning activity by using the model was 70 percent.

Introduction

At present, Thailand has entered "Elderly society" due to changes in the population structure of Thailand. According to data from the National Statistical Office (2017), in 2017, the proportion of elderly accounted for 16.70 percent or 11.30 million people and is expected to more than double by 2031 to 28 percent, –more than a quarter of the total population. This steady increase in the proportion of the elderly in the Thai population is significant. While the working-age population of those who provide financial support for the elderly has been decreasing since 2010, the current average of 6 working-age adults per

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1 elderly person needing care will be reduced to a ratio of only 2:1 by 2030, which will result in a huge burden on the working-age population trying to support the elderly (Foundation of Thai Gerontology Research and Development Institute, 2016). Therefore, in the formulation of human resource development policies in Thailand, there are guidelines to promote the development of skills, knowledge, ability to use technology and skills to live happily and with good health among the elderly. As exemplified in the national strategy of Thailand 2018–2037, with its goal of social empowerment in the creation of technology and innovation for promoting learning among the elderly (National Strategy Secretariat Office, 2018), and the National Education Plan of Thailand 2017–2036 (Office of the Education Council, 2018) Strategy 3, Target 2, both specify that the elderly should receive education services for vocational skills development and increased life skills.

In developing education and training courses to enhance the quality of life for the elderly, education and lifelong learning activities should be organized in accordance with the 21st century learning styles that focus on analytical learning process skills by applying the principles, expanding research knowledge, and developing innovation that is disseminated through digital communication. People should have access to learning resources, media, textbooks, innovations, and learning media of high quality and standards without limitations of time or location (Office of the Educational Council, 2018). In addition, the Canadian Education Research Information System (CERIS) points out that the skills associated with modern technology, media literacy, and the use of equipment and computers are important features that lead to health literacy (Kickbusch, 2001). The World Health Organization defines health literacy as social and intellectual skills that create the motivation and abilities that allow a person to access, understand, and use the information received to promote and maintain health. Nowadays, elderly people are more interested than ever before in learning to use technology. The majority of elderly people own or are in possession of a smartphone. This is beneficial in terms of access to information, but the benefit is limited by limited knowledge of how to use the devices effectively, and a lack of a capable teacher to help them (Mohadis & Mohamad, 2014). Therefore, there must be a strategy to help elderly people understand how to access and use available information technology. In Thailand, the Ministry of Public Health has developed a lot of technology media that disseminate knowledge to promote good health in society. The objectives of this research were: (1) to study the needs and create a technology utilization model to promote health literacy in the learning resource center for the elderly, and (2) to study the results of the use of the technology utilization model to promote health literacy in the learning resource center for the elderly. The technology utilization model has a learning plan that focuses on step-by-step processes so that those not familiar with the use of technology can easily access and use it. This provides a tool that allows elderly people to have a true learning experience arising from practice—one which promotes health literacy effectively.

Literature Review

Health Literacy

The World Health Organization is campaigning for member countries to realize the importance and work together to develop public knowledge about health (World Health Organization, 1998), while also recognizing that health literacy represents the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use information in ways which promote and maintain good health. Nutbeam (2008) defines health literacy as cognition, social skills, and analytical thinking that determine individual motivation and ability to access, understand, assess, and use knowledge to achieve good health. This includes knowledge development to understand in a health context that allows for changes in attitudes and motivation allowing each individual to induce appropriate health behavior independently. A key element of this skill development is access to communication about health information needed to promote and maintain good health throughout life. In addition, the Center for Health Care Strategies (2013) has identified essential skills for individuals who are involved in the health care system to maintain good health. These skills include reading and writing, calculating numbers, communicating with health professionals, and using health-related technology. To summarize, health literacy is the ability of people to access, understand, communicate, assess, and use the information to promote and maintain good health. Health literacy can be improved by developing 6 characteristics which are (1) access to health information and health services, (2) cognitive health, which is the knowledge and conscious awareness of important issues in the practice of good health, (3) the ability to define alternatives and to reject/avoid unhealthy practices, or choose healthy practices, (4) media literacy, which means having the ability to check the accuracy and reliability of information presented by the media for use in self-care, (5) health self-management, which is the determination of goals and plans for individual actions leading to correct health behavior, and (6) health communication, which is

communication by speaking, reading, writing information about how to be healthy.

The Elderly People

A number of concepts have been developed concerning the principles for promoting learning among the elderly. For example, Cass (1956) proposed that learning principles for the elderly must be voluntary and that elderly people are interested only in learning what is seen as useful and can be used immediately. Furthermore, seniors want to participate in their studies. Knowles, Holton, and Swanson (2011) identified elements of adult and senior learning that help them to learn well. The elderly people are ready to study when they feel that it is essential to their role and social status. The elderly people are motivated to learn by internal motives, such as an interest in self-improvement or life fulfillment. In addition, Istance (2015) and Vaportzis, Giatsi Clausen, and Gow (2017) discussed ways to help the elderly learn better, namely, giving the elderly time to learn more. A number of methods were suggested, such as allowing the elderly to learn in relation to their previous experiences and knowledge, improving the physical environment, such as adding sufficient light.

Learning Technology

Other concepts of using technology to promote learning have been developed; for example, the Higher Education Funding Council for England (2009) has worked on technology that helps improve teaching in an effort to create excellent and innovative learning. Providing flexibility and an option for students to increase their skills attracts the attention of learners and helps them retain the course material. Easy access and wide participation improve the curriculum and increase the efficiency of the study environment. Additionally, Kirkwood and Price (2014) discussed the meaning of learning promotion technology, referring to information and communication technology, or teaching and learning facilities that play a role in helping learners to achieve satisfaction. In addition, Astell, Bouranis, Hoey, Lindauer, Mihailidis, and Nugent (2019) mentioned the definition of technology to promote learning for the elderly, saying that it is a technology that stimulates the ability to think, learn, read and understand what is read. In the research of Zhao et al. (2020), researchers developed mobile phone applications and trained study participants in their usage. These smartphone applications improved the quality of life for the elderly in China. The results showed that the ability to use smartphones and the quality of life of the elderly in the experimental group increased, at a statistically significant level of .05.

Learning Resource Center

As for the concepts of the 21st century learning resource center, Truschel and Reedy (2009) defined it as a way to change the environment and resources, including the learning system, into a learning center and learning space through reliance on a variety of styles that are in line with the learning path of the learner. At the heart of the learning resource center concept is interactive learning through action, which focuses on action learning and team learning designed to be suitable for learners either in groups or individually. It also makes use of learning motivation and inquiring minds and encourages continuous self-learning (self-directed learning) for people to develop themselves (self-development) through the use of the tools of learning, resources, and social contexts of learning, which can be linked to various learning resources in the local area. The components of the learning resource center consist of the policy, objectives, operation of the center, management action planning, set time period responsibility, plan implementation, operation budget, personnel organizing areas for carrying out learning activities service model media, and equipment for providing educational activities or organizing activities within the center plan, along with carrying out evaluation and using the evaluation results to further develop the plan (Aect Task Force II, 1983).

Methodology

The research methodology was divided into two phases. The first phase began with studying the needs for a technology utilization model to promote health literacy. This involved 6 experts and 434 elderly people in Bangkok and its vicinities. The 6 experts interviewed were specialists in the development of technology utilization models to promote health literacy for the elderly in the learning resource center, and were selected through purposive sampling. The 434 population samplings were selected through the quota sampling method and utilized the Taro Yamane formula at a confidence level of 95 percent. It mainly consisted of elderly people, aged 60 years and above, living in Bangkok and its vicinities, i.e. Samut Prakan, Nonthaburi, Nakhon Pathom, Pathum Thani, and Samut Sakhon. The tool used for collecting data was a questionnaire seeking opinions about the need for the use of technology to promote health literacy for the elderly in the learning resource center. The questionnaire was evaluated by three experts and the index of item-objective congruence was found at .93. It was then subsequently used to analyze the questionnaire data by using the modified Priority Needs Index (PNImodified) method.

The data developed from the opinions of experts and the elderly were used to design tools for teaching, consisting of (1) learning management plan, (2) health literacy test (pre-test and post-test), (3) study behavior observation form, (4) learning activity log, (5) satisfaction survey form for assessing learning activities, and (6) technological education media for the elderly. After that, the model and tools for teaching the use of technology to promote health literacy for the elderly in the learning resource center were presented to 7 experts for evaluation of the model and suggestions for improving and completing it. These experts were specialists in the field of health, elderly issues, and technological and educational communications, or learning resource centers with a minimum of 5 years' experience, and were selected through purposive sampling. The experts used evaluated forms to assess drafts of the technology to promote health literacy and assessment tools for the elderly in the learning resource center.

Phase 2 involved studying the results of using a technology utilization model to promote health literacy among the 20 samples that used the model. It was two groups of quasi-experimental research methods, utilizing both pre-test and post-test. The subjects in this study were 12 elderly people from the Laemthong athlete village club, Saphansung district, Bangkok, Thailand, and 8 elderly people from the learning center in Bangchalong Temple Sub-district, Samutprakan province, Thailand, totaling 20 people. These samplings were selected through the purposive sampling method, based on the elderly who were aged 60 years or above, living in Bangkok and its vicinities, who were also members of an elderly club or an elderly learning resource center group, and who showed interest in the use of technology and utilized a smartphone or tablet on a daily basis. Volunteers who were readily available for the trial were also requested to participate until the specified time was complete. Data analysis and results from the trial were used to improve the model.

Results

The results of this study are divided into two parts. The details of the data analysis are as follows:

Part 1: The results of the study of needs and creation of a model for using technology to promote health literacy in the 21st century learning resource center for the elderly based on interviews with 6 experts and data collected from 434 elderly persons indicated that the learning resource center for the elderly should be located in the community or a place where elderly club members meet for regular activities. It should also be a place where there are small groups of personnel available to act as volunteers to advise and manage the learning resource center. Each group should not exceed 5 people. The activity duration should not exceed 1-3 hours. The use of technology to support health literacy for the elderly should be communicated through images with clear colors, concise text with large font size, and divided into sub-topics. Designing this model for using technology to promote health literacy for the elderly in the learning resource center takes 15 days, which were used to develop learning activities consisting of 7 pattern elements and 3 stages of learning activities. The results from using the model were a rise in health literacy consisting of 6 characteristics: (1) access to health information (2) cognitive health (3) decision making (4) media literacy (5) health self-management, and (6) health communication.

The components of the technology model to promote health literacy for the elderly in the learning resource center consisted of 7 components which were: (1) The target group comprised seniors aged 60 years or older who were members of elderly clubs or the elderly learning resource center, who were interested in learning to use technology, and who had a smartphone or tablet for daily use. (2) The purpose of the technology model was to promote health literacy for the elderly in the learning resource center and to act as a guideline for the use of technology for health literacy for the elderly seniors in a learning resource center. (3) Management should be provided by facilitators consisting of representatives drawn from community leaders and volunteer group leaders who should work together to plan the implementation of learning activities and assess plans. (4) There should be continuous hosting of activities that the elderly clubs or groups of members or agencies supporting the elderly can access and conveniently travel to within the building. There should be equipment for organized activities such as tables, chairs, monitors, electric projectors, internet networks, microphones with temperature control, and proper lighting, all available in an area unaffected by background noise. (5) Content, including access to resources understanding, and discrimination for health for the elderly such as good food and nutrition, should be meaningful and relevant. Examples of possible topics could include: how to take the right medicine, physical examinations and symptoms of illness, suitable exercise for the elderly, oral health care, common diseases in the elderly, communication, and media literacy. Technology related topics were also suggested, such as methods of using network equipment, installing and launching mobile phone applications, and installation and use of software, including the use of smartphone and tablet devices. (6) Technology for promoting learning for the elderly should include a number of elements. (6.1) smartphones and tablets (with applications) are devices that most seniors

carry around in everyday life. Therefore, they can be used as learning media for the continuous organization of learning activities in a learning center. Smartphones and tablets that are used to learn effectively should be equipped with at least the minimum operating system—iOS 12.1.1 or Android 9.0 with installed applications from the Ministry of Public Health for use as a learning medium and for accessing health information for the elderly. (6.2) motion graphics, health content and video clips on fall prevention would be useful and are recommended. (6.3) infographic labels and QR codes for health education are recommended. (7) Assessment tools. Details of the model are shown in Figure 1.

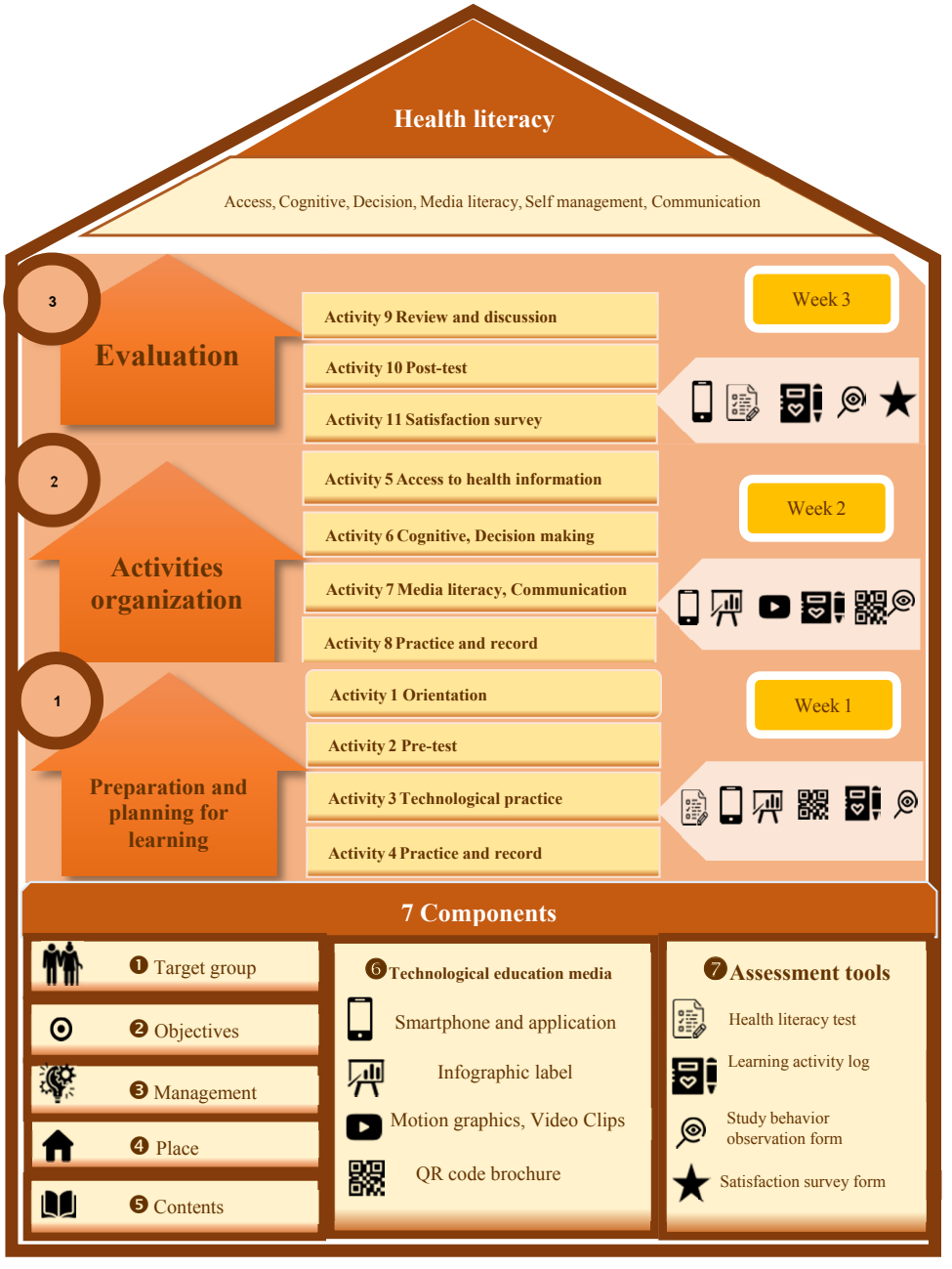

Figure 1 Technology Utilization Model to Promote Health Literacy in the Learning Resource Center for the Elderly

Learning management of the technology to promote health literacy for the elderly in the learning center used in this study consisted of 3 phases or procedures shown in the calendar of learning activities in Table 1. In assessing the use of technology to promote health literacy for the elderly in the Learning Resource Center, the 7 experts certified the use of the technology and expressed the opinion that its periodic implementation results in outcomes rated at a high level ($x = 4.46$).

Part 2: The results of using the technology model to promote health literacy for the elderly in the learning resource center and samples from the elderly of Laemthong athlete village Bangkok and the elderly from the Bangchalong Temple learning center Samutprakan province are as follows (1) The comparison of scores from the health literacy test taken before and after studying analyzed by the t-test dependent test shows that the average of the health literacy scores after all 20 subjects had studied was higher than the average of the health literacy scores from tests taken before learning at the statistically significant level of .05. (2) Evaluating of the success of the learning activity considered 4 areas, which were; (1) health literacy development score from health literacy measurement (2) learning behavior score from the behavior observation study (3) learning activity log score, and (4) the average satisfaction level from the learning activities. 14 people from the total population of twenty were assessed on all 4 aspects. This comprised 70.00 percent of the total sample of elderly participants. Eight members of the first group (out of 12 total) completed all 4 aspects, accounting for 66.67 percent of Sample Group 1. Six members of the second sample group (out of 8 total) completed all 4 aspects, representing 75.00 percent of Sample Group 2.

Discussion

The strength of the technology design to promote health literacy for the elderly in the learning resource center is the development and application of technology in teaching according to the principles that support the learning of the elderly born during the Baby Boom era. Teaching elderly people more about smartphones, tablets, and applications -- technology that plays a role in the lives of people in the 21st century, -- is consistent with the research findings of Rasi and Kilpeläinen (2016). The elderly people are more open to obtaining information and news from modern media. Accessing health information, which is of primary importance to the elderly, as the main content for learning activities, is of great benefit. Furthermore, providing training for the elderly to access sources of health knowledge provided by government agencies and organizations through applications, is highly beneficial, and consistent with the findings of Knowles (1980). In fact, Knowles et al. (2011) presented the learning components of adults and the elderly that help the elderly learn better. Elderly people want to learn new things and are ready to learn when they believe that the subject of learning is necessary for their lives; however, the knowledge gained must be utilized immediately. In addition, the results of the use of the health literacy promotion technology model for the elderly in the learning resource center in this research were consistent with the policy of service provision and human resource development to the elderly society. It is, therefore, a guideline for research on human resource development in the future to meet the national strategy of Thailand 2018–2037.

Table 1 Calendar of learning activities

Activities	Day														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
procedure 1 the preparation and planning for learning															
activity 1 orientation	●														
activity 2 pre-test	●														
activity 3 technological practice	●														
activity 4 practice and record	●	●	●	●	●	●	●								
procedure 2 activities organization															
activity 5 access to health information								●							
activity 6 cognitive and decision making								●							
activity 7 media literacy and communication								●							
activity 8 practice and record								●	●	●	●	●	●	●	
procedure 3 evaluation															●
activity 9 review and discussion															●
activity 10 post-test															●
activity 11 satisfaction survey															●

Conclusion and Recommendation

The use of technology models to promote health literacy for the elderly in the learning center should consider the following factors: target group, objectives, management, content technology to promote learning for the elderly, along with complete assessment tools since the distance of learning activities and health knowledge of the elderly are affected. Teachers play a very important role in teaching the elderly. The assistance should be provided to the elderly during the learning activities; the teacher or facilitator should be someone with characteristics that the elderly trust, making them ready to follow the advice of the teacher. This research focused on the use of technology in promoting health literacy for the elderly in the learning center. Future research should be conducted on the production and development of technology media to increase the potential of the elderly in hospitals through promoting learning activities by volunteers or public health personnel organizing the learning activities.

Conflict of Interest

There is no conflict of interest.

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