THERAPEUTIC STRATEGY IN GAMIFICATION AND GAME BASED LEARNING FOR ELDERLY PEOPLE IN THAILAND

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Abstract

Purpose: This study aims to review the literature of the therapeutic strategies in gamification and a game-based learning for elderly people. During the increasing of the aging city in Thailand, how to prepare and how to live up the society are challenged. Gamification as a Game-based learning is a key issue in terms of conception. The conception of the game focuses on establishing trust with players and finding the right way to motivate the players to care for their health and to encourage the players to set goals.

Methodology:A survey of healthcare for aging people was conducted in regard to technology-driven gamification.Gamified training appears to be highly engaging and does boost participant motivation.The survey attempts to examine Thai culture in terms of game technology and family networks and supports the influence the health-promoting behaviors among older persons.

Main Findings: The reviews illustrate the role of game-based learning in therapeutic strategies. In accordance with the Gamification Concept, the concepts of games are broad in scope,encompassing various contexts, such as training. The results of this findings may influence Thai elderly to care their healthy by using gamification. The game design shows the Health Care Training Game and Gamification prototype.

Implications: Gamification strategies may contribute to sustainable healthcare in Thailand.The designing game examines the therapeutic strategy game by establishing a technology-driven trust relationship with players, and then determining the best way to motivate the players to care for their health.

Originality: Knowledge and skills can be improved by using game-based learning. A learning game is a self-contained unit with start, game play and ending activities. The games are based on a combination of well-known game-design principles and principles of task-oriented training and involve the manipulation of everyday physical objects.

Keywords: Gamification; The Therapeutic Strategy; Game-based learning; healthcare; Elderly

INTRODUCTION

This research aims to analyze the needs and challenges of older adults and to review their attitudes and motivations towards their healthcare in Thailand. However, several studies have shown that adherence to therapy supporting a healthy lifestyle is low (Tabak, 2014). The study focuses on the approaches for the development of socially interactive health activity programs with the goal of increasing positive lifestyle motivations and quality of life (QoL) in Thailand. Thailand is an aging society in which the percentage of elderly people is increasing.

The gamification concept has a broad scope and encompasses various contexts such as education and training. Technology now allows people to measure things like how many steps they take, how much they sleep and how much they exercise, which can help them to become healthier and improve their performance. There are some examples of games that employ new strategies that create meaningful and playful fitness applications for older adults (Mora, 2016). The increasing relevance of gamification in the cognitive training domain by the academic community is evident with 48.76% of the search results of Google Scholar from 2014 to 2015, in the field, together with further references, like physical training at 30.50% (Mora, 2016).

In terms of engagement, an older adult exercise by using emerging technology, such as virtual augmentation. The technology creates a strong presence in a virtual, interactive environment, and can be taken to greater levels. For instance, older adults' virtual, interactive environments can influence postural control and fall events by stimulating sensory cues that are responsible for maintaining balance and orientation.

However, the interactive healthcare training has yet to be explored for older adults in Thailand. Healthcare is the main focus in this study and includes the enhancement and motivation for better health behaviors related to exercise, nutrition, medication adherence, weight control, etc. Training should include the assessment of health. A healthy lifestyle can be measured in terms of physical improvement (Mora, 2016). This paper reviews the conceptual framework for training in interactive gamification in regard to how aging people engage in the interactive environment, the technologies offered and how their perceptions of the activities are examined. Also, the health game concept will design from the literature reviews.

LITERATURE REVIEW

Gamification is defined as the use of game elements and mechanics in non-game contexts (Seaborn, 2015). Gaming as a highly pervasive activity can be seen as the intense training of several skills. Digital games are a medium of entertainment. The essential aspects of gamification, which make game(ful) experiences, are that they are immersive, engaging and fun (Seaborn, 2015). Video game training could be used to counteract known risk factors for mental disease such as a smaller hippocampus and prefrontal cortex volume (Kühn, 2014). In terms of health, a game that supports arm-hand training for stroke survivors aiming to render rehabilitation training can be enjoyable and sustainable, the games are based on a combination of well-known game-design principles and principles of task-oriented training and involve the manipulation of everyday physical objects where difficult tasks can influence the patient's performance (Jacobs, 2013). Knowledge and skills can be improved by using game-based learning. A learning game is a self-contained unit with start, game play and ending activities. Games can provide different types of learning content in different settings.

Gamification uses various game elements. Learners participate in activities that include video or mobile game elements such as earning points, overcoming a challenge or receiving badges by accomplishing tasks (Deterding, 2011). Gamification can also be helpful for scenarios where leaders have to continually update workforce knowledge. For instance, a mobile sales force selling technical products such as cell phone services and subscriptions would be an excellent target audience for gamification delivered via mobile devices. (Deterding, 2011).

By mapping the published work to the classification criteria and analyzing them, the study highlights the directions of the empirical research when applying gamification to education. It also indicates some major obstacles and needs, such as the need for proper technological support, for controlled studies demonstrating reliable positive or negative results of using specific game elements in particular educational contexts, etc. Although most of the reviewed papers report promising results, more substantial empirical research is needed to determine whether the extrinsic and intrinsic motivation of the learners can be influenced by gamification (Dicheva, 2015).

Interactive Gamification for Training

Many older adults are concerned about maintaining a healthy level of physical activity. The challenges of healthcare can include decreasing strength, reduced mental capacity, social isolation, and the development of chronic health conditions (Kappen, 2015). The implementation of motivating mechanics in game design in production environments by integrating them in the process can be called "gamification". The study analyzes the work in real-time and enables us to make the work processes transparent, visualizing them in real-time as bricks in a puzzle game (Korn, 2012). Aging people can be motivated to play games that enhance their health (Meurer, 2012). The working memory and general executive functions are common targets for both gamified assessment and training. Gamified training appears to be highly engaging and boosts participant motivation, but there are mixed effects of gamification on task performance (Lumsden, 2016).

This paper focuses on the processes of behavioral outcomes. The processes provide guidelines for gamification listings such as target personas, game elements and measurement as follows:

- Define the target personas; how they think and how they act in terms of daily behavior;
- Define the criteria for target purposes such as engagement, activity or conversation;
- Define the inventory tools and environments such as applications, social media or the classroom;
- Define game mechanics and game dynamics for each content;
- Define the measurement results

The Elderly Health Care

According to the Thai Stroke Registry, the onset of stroke in Thai patients is earlier than those in developed countries. This may be due to control the vascular risk factors in the Thai population are limited (Suwanwela, 2014). Stroke prevention plays a crucial role in aging society. Prevention can control a modifiable risk factor and lifestyle changes (Di Legge, S., et al., 2012). Then, the challenge study is how to reduce the risk of recurrent stroke and other vascular events. According to the top cause of adult neurological disability in Thailand (Idro, et. al., 2005). The prevention factor in terms of lifestyle is a routinely warranted: aerobic exercise to country inactivity, weight loss in obesity, glucose control in diabetics, and dietDi Legge, S., et al., 2012). Physical activity and exercise training recommendations for stroke survivors should be viewed as one important component of a comprehensive stroke risk-reduction program (Gordon and Baldwin-Philippi, 2014).

Aerobic Exercise

Exercise and other forms of physical activity have been associated with both physical and psychosocial benefits to older adults. Interventions that strengthen self-efficacy and outcome expectations related to exercise might improve exercise behavior (Resnick,2001). The improving physical functioning positive effects are of great value for the physically impaired older adults (De Vries, N., et al., 2012). Some research shows the evidence that the patient exercise program is feasible in low and intermediate risk the Myelodysplastic syndromes (MDS) patients (Schuler, M.K., et al., 2016). Kramer (2006) finds a causal relationship between fitness training and improved cognition, more efficient brain function, and spared brain volume in older people. Maillot (2012) supports that physically simulated sports games are directly involved in functional abilities needed by older adults in everyday living. In Thailand, exercise training can improve lung capacity, which related

to physical health status. Exercise is a good approach to improve health-related quality of life and reduce cardiovascular risk factors such as Thai wand (Wichitsranoi, J., et al., 2011). Exercise may be the health care strategies by using game-based technology. Exercise plays a vital role in reducing the risk of stroke and can improve people overall well-being (Exercise and stroke, 2017).

Weight Loss and Diet

One of the big problems is overweight in elderly people. Lack of effective physical function is concerned. Weight loss and diet can help more to improve physical function, pain, and mobility in older, overweight and obese adults with knee osteoarthritis (OA) (Messier, S.P., et al., 2004). Weight loss in older persons can increase mortality and increases the incidence of hip fracture, functional deterioration, and institutionalization (Morley, 2007). The existing evidence suggests that adherence to healthy dietary patterns (i.e., Mediterranean or DASH) was associated with reduced risk for stroke (Meropi, 2014). The information provided can contribute people for preventing the effect. Such as mobile application was useful for obtaining information and managing the diet process. The Smart Diet mobile weight management application can contribute to weight loss in obese adults (Lee, W., et al., 2010). Moreover, a consistent protective effect of higher adherence to the Mediterranean diet on stroke incidence. Thus, a healthy dietary pattern exerts a beneficial effect on stroke incidence(Meropi, 2014).Weight control may be the health care strategies by using game-based technology. The information alert may influence people concerns their health such as the time for exercise. Exercise performed three times per week lowers blood pressure and should reduce cardiovascular risk (Jennings, et al., 1986).

Glucose Control

Modern critical care concerns the principle of restoring aberrant respiratory, cardiovascular and some parameters to physiologic levels effect on oxygen delivery and uptake that would confer a survival benefit (Finney, et al., 2003). The benefit determines whether blood glucose level or quantity of insulin administered is associated with reduced mortality in critically ill patients, for example (Finney, et al., 2003). Glucose control relates to the prevalent and incident diabetes mellitus that increases the risk of cognitive decline (Yaffe, et al., 2012). Other beneficial effects were enhanced glucose utilization during insulin infusion, but only after exercise three times per week (Jennings, et al., 1986). Glucose control is one of the most health care strategies for older people in Thailand. Epidemiologic studies have suggested that even minor impairment of glucose tolerance may increase risk for cardiovascular disease (Jennings, et al., 1986). The reminding strategies may help elderly people by using the right way of technology.

METHODOLOGY

This study aims to examine the gamification process for aging people with motivation to invoke memorable experiences and to bring about behavioral outcomes.
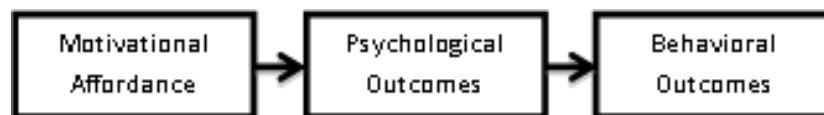
Fig. 1. The process of Behavioral Outcome Adapted from (Hamari, 2014)

Currently, gamification means utilizing the features of games in other health-related applications (Robertson, 2010). Target behavior is embodied in a point or reward system. The reward systems involve intrinsic and extrinsic motivation. This paper aims to collect information on how to address the problems of aging users. The main objective of this research is how gamification can be used in physical and cognitive therapy focus.

Motivational Affordance

Motivational affordance is where the relation between the features of an object and the abilities of a subject allow the subject to experience [Situated motivational affordances of game elements-A]. However, older people can be confused and frustrated by technology (de Vette, 2015). The activities require careful design to address the problems of the aging in terms of accessibility and usability of the content (de Vette, 2015). Technology can encourage people to explore and encounter new things. Lazzaro (2004) categorized emotions in games without a storyline through adult gaming experiences as follows:

- Hard Fun: players like challenges, strategy, problem solving, experiencing frustration;
- Easy Fun: players like intrigue and curiosity and enjoy immersion;
- Altered States: players search for internet sensations such as excitement;
- The People Factor: players use games for social experiences (Lazzaro, 2004).

Psychological Outcomes

Need satisfaction theories states that people seek out and engage in activities if they promise to satisfy motivational needs, such as competence, autonomy, or relatedness (Inchamnan, 2016). Older adults may relate to games differently from younger users (de Vette, 2015). Game design should be customized to reach older adults' goal, which includes health

issues. For example, diabetes in elderly adults is associated with an increased risk of fall (Lee, 2013) and stroke and the stroke factor can be reduced by exercise. Consequently, virtual reality exercise is effective in reducing the risk of falls in adults (Lee, 2013).

Behavioral Outcomes

Non-game contexts can act as internal drivers for customers and end-users and bring about behavioral change (Seaborn, 2015). Inchamnan (2016) mentioned that older people in Thailand increasingly use mobile phones and tablets, and the study examined a free game called Epson iMatch in IOS and Android (Inchamnan, 2016). The findings showed that older people spend their free time playing games. Gameplay focuses on usability and easy rewards. Older adults play easy games and with short timeframes for each quest. This concept should be applied to older adults in terms of game-based learning in healthcare. The person's behavioral outcome depends on their culture and environment. The review should examine Thai behavior in terms of healthcare. The expected behavioral outcomes are sustainable behaviors, such as caring about health. Gamifcation should be developed to use the technology in a therapeutic way. There is a need to establish trust with players, and then to determine the best way to motivate the players to take care of their health and to encourage the players to set goals.

Game Based Learning

Digital games within the multimedia-learning environment may foster the learning process effectively among learners (Sweetser, 2008). An appropriate game element should be developed based on some criteria which fulfill the requirements learning objects; Mediate material learning; Organize learning goals; Motivate to learn and Improve assessment learning. Tan, P.-H., et al. (2007) points out the design framework for edutainment environment has two unique elements which are difficult to learn and psychological needs. Game tasks can mediate material of learning. Playing games have a significant role to help people to learn to solve their problem (Myers, Well, and Lorch, 2010). However, the efficiency strategies may base on how elderly people care about their health. The elements in the game will encourage elderly people to care their health in terms of trust, motivation and goal setting. Game activities that energize players with a high degree of arousal have the potential to enhance creativity. Video games have been demonstrated to improve visual perception, processing and attention MacLean, et al., (2010). Games may present a series of challenges and can provide the incentive to engage in the act of gaining knowledge.The evaluating learning can change the current goal, involves a person's perception of the situation, the interpretation of that perception and an eventual evaluation of those perceptions. Then, the game concept may help encourage elderly people to play the game.

A Designing of Game Based Learning in Therapeutic Strategies

The literature review found the relation between Game Based Learning in Therapeutic Strategies. The findings aim to establish a relationship with players' trust, then finding the right way to motivate the player to care their health and the supporting the player to set goals.

Table 1. Game based learning and therapeutic strategies.

Findings	Details	Author	Discussion
Trust How to trust the tools, who involves	The game can: - Encourage people to reflect on specific policy or planning decisions - Reflect on the role they and other members of a community play within the overall civic process	Gordon, 2014	Trust depends on the government and community in-involvement.
To evaluate the learning	Performance improvements after training on the tools, reiterating the importance of game selection for rehabilitation purposes	dos Santos Mendes, 2012	Improve trust by using evaluation method
Motivation: Know the action	In game context, motivation can be defined as the set of game characteristics that prompt a player to realize specific actions and continue the game task until goal achievement.	Sánchez, J. L. G., et al. 2009	Evaluate their action
Believe in their skills	Motivation makes learners believe in their skills. Motivational beliefs act as a frame of reference that guides students' thinking, feelings and actions in a subject area.	Boekaerts, M. 2002	Improving their health by encouraging extensive motivation
Fulfillment their need	Motivation refers to what a person will attempt, yet ability is defined as what a person can do.	Wolters, C. A., et al. 1996	Role play for fulfillment need by using game avatar for therapeutic

			strategices
Positive motivation			
	The game activity can have a positive impact on learning, intrinsic motivation.	Amabile, T. M. 1996	Intrinsic motivation can share the positive moment to their community
Goal: Goal is a crucial of motivation to care their health	Players translate goals conceived in psychological terms to actions suitable for the system.	Norman, D. A. and S. W. Draper 1986	Goal can motivate elderly people to do something
Clear Goal	Ensure that clearly goals that allow people to develop their own sub-goals and problem-solving skill.	Inchamnan, 2016	Game-based activities show the sub-goal for people in sub-care health care
Help to evacuate their activity	In order to evaluate whether a game goal or sub-goal has been achieved, some kind of cognitive processing needs to occur.	Norman, D. A. and S. W. Draper 1986	Divide sub-goal for care their health help elderly people easy to understand their goal

In designing a game-based learning in therapeutic theme bases on the previous research. The conception illustrates the establishing a relationship with players' trust, then finding the right way to motivate the player to care their health and the supporting the player to set goals.

Fig. 2. The Relation of Game Based Learning in Therapeutic Strategies

The picture shows the relation of games-based learning in therapeutic strategic literature reviews. The sustainable health care consequences of the self-care training which older people can take care themselves. Game play involves players performing actions and assessing the outcomes. It is through interpreting and reflecting upon feedback within a game that players refine their behaviors. The key concepts may encourage elderly people to care their health. Then, the self-care training is a key concept of the therapeutic strategies by using game-based learning as a tool. People may sustain good health by self-concern the tools through trust, motivation and goal setting. Then, the game for self-care training will include:

- The evaluate action;
- The reward game which link to real-life action;
- Role plays for fulfillment, such as player Avatar
- Share the positive moment to their community (Intrinsic motivation);
- Providing sub-goal.

HEALTH BEHAVIOR IN THAILAND

The existing evidence shows that health promoting behavior is influenced by a variety of factors. Health behavior can be predicted from attitudes, subjective evaluations of behavioral consequences, social norms as a social influence, past habits and facilitating factors that induce health promotion practice (Jo, 2003). Family history may also impact the health behavior of the elderly.

Procedure

This study surveys the health behavior and gameplay behavior of adults in Thailand the mean participants' age is 38 (69% female). The educational background is less than undergraduate (11%), undergraduate (49%), Master (32%), and PhD (5%). The rate of strokes in the family was around 17%. The 100 participants completed a questionnaire that includes the sense of well-being for the aging, which may be the most important feature in the relationship with health-promoting behaviors (Thanakwang, 2008). Normally, they play games one a week and use a mobile phone for playing games (60%). The survey attempts to examine Thai culture in terms of game technology and family networks and supports the influence the health-promoting behaviors among older persons.

The Health Care Game

Table 2: Play the Health Care Game

Source	Variable	F	Significance
Play Health Care Game	Family History of Stroke	5.235	.001
	Knowledge about Stroke	2.671	.037
	Play Games	6.012	.000

These results show the participants who played the health game based on their family history of stroke, knowledge about stroke and regular gamers ($\alpha < .05$).

The Family History of Stroke

Table 3: The family history of Stroke

Source	Variable	F	Significant
Family History of Stroke	Knowledge about Stroke	7.451	.000
	Gender	5.508	.003
	Degree (of what?)	4.811	.007

Table 3 shows the significance of the family history of stroke related to knowledge about stroke, gender and degree of participation ($\alpha < .05$).

Health Care Training Game and Gamification

These findings show the way to design game-based training for healthcare in Thailand. The anticipated framework aims to prepare people in regard to how to live in society. The conception method is designed to address the establishment of a trust relationship with players and then to determine the best way to motivate the players to care for their health and to support the players to engage older users effectively. In Thailand, older people increasingly play games, use mobile phones and new technology in their lives. Gamification strategies include motivation to play a game based on the family history of stroke and healthcare learning. The elements should include older people's thinking about how to act in the daily behavior. The design of the health game may include the color, font size, and a gameplay that is easy to understand.

Structural Elements of the Game Concept

The following section gives a detailed description of the game concept based on the review of previous literature and the survey findings.

Players

The game is aimed at young adults who use technology in daily life such as mobile phones. The players are concerned about their help in terms of stroke and have no or little previous gaming experience.

User Interface

To account for the needs of its target audience, the game features primary input devices that are accessible to seniors. Players are free to engage in the game by using a mobile phone. Regarding the graphical user interface, in-game graphics were designed to meet the needs of older persons including large fonts that are easy to read. The relevant game objects are highlighted through contrast and color settings.

Core Mechanics

The core mechanics of the game were designed to meet the special requirements of older people. Basically, the game features a drastically reduced level of complexity in order to allow senior citizens without prior gaming experience to play.The game offers the possibility of deactivating one or more roles in order to reduce the complexity of the game and to allow the player to focus on his or her strengths to encourage a positive gaming experience.

Gamification

The design of the game relates to gamification in the use of game thinking and game mechanics in non-game contexts to engage the player to take care of themselves. The score of the game play aims to fill the personal or social connection gap. The rewards of the mobile game can encourage players to play more and enhance their health. This study focuses on the relationship between game design and gamification for the aging. A therapeutic strategy game for the aging may encourage them in terms of encouraging healthcare training as a gamification concept.

Fig. 3. UI Game Design

DISCUSSION / CONCLUSION

The sustainable care consequences of the self-care training in aging society. The older people can take care themselves by developing trust, motivation and clear goal. The research presented in this paper that reviews existing research can be successfully adapted for use in game-based the ideas that influence the factors that encourage good health practices. The activities should motivate players to evaluate health issues, have clear goals and use technology in healthcare. Self-care training is one of the most frequently-used interventions in therapeutic strategies. A person's healthcare situation depends on his/her environment. Thus, therapeutic strategies may be adapted by studying the players' care environments, such as age, career, demographics and others. Self-care is a good choice for people who want to prepare themselves for a future smart retirement. Game-based learning may help to encourage the players to care about their health. The effect of healthcare in regard to stroke has recently achieved much interest in various neurological areas. This study focuses on in-game player activity in terms of the effects of three levels of activity of aerobic exercise to country inactivity, weight loss in obesity, glucose control in diabetics, and diet. The designing game should provide the game tasks that help people trust in activities. This study examines the therapeutic strategy game by establishing a technology-driven trust relationship with players,and then determining the best way to motivate the players to care for their health and to encourage the players to set goals.A survey of healthcare for aging people was conducted in regard to technology-driven gamification. The results of this findings may influence Thai elderly to care their healthy.

LIMITATION AND STUDY FORWARD

As the time limitation, the game play cannot evaluate. The future work will illustrate how the gamification game can encourage elderly people in terms of health care.

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