Serious Games for Health Communication: Future and Challenges

เกมคิดไตร่ตรองเพื่อการสื่อสารสุขภาพ: อนาคต และความท้าทาย

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Abstract

Individuals are predominantly exposed to something that makes them entertained, relaxed, and fun. Without doubt, games play an important role of responding to such people's needs. In health orientation, besides entertainment gratification, games provide better learning and understanding, persuasiveness, and health behaviour adaptation. Of all types of gamification, serious games are particularly addressed in this paper because of their high popularity, not only in healthcare and public health, but also in other fields of study. Some examples of serious games including Escape from Diab, A Mysterious Poisoning, and StreetWise are given in this paper. Their future and challenges are discussed.

Keywords: *Serious Games, Digital Games, Gamification, Behaviour Change, Health Communication*

บทคัดย่อ

โดยส่วนใหญ่แล้ว คนเรามักจะชอบเสพสิ่งที่ทำให้ตนเองบันเทิง ผ่อนคลาย และสนุกสนาน เกมจึงมีบทบาทสำคัญในการตอบสนองความต้องการดังกล่าว ในบริบทด้านสุขภาพ นอกจากเกมจะสามารถทำให้คนเรารู้สึกบันเทิงและสนุกแล้ว เกมยังสามารถทำให้เกิดการเรียนรู้และความเข้าใจที่ดีขึ้น ชักจูงใจ และทำให้เกิดการเปลี่ยนแปลงพฤติกรรมได้อีกด้วย ในบรรดาประเภทของเกมที่เน้นการให้ความรู้และความเข้าใจ เกมคิดไตร่ตรอง ถูกนำมาอธิบาย เนื่องจากความนิยมในการนำมาใช้ในบริบทการดูแลสุขภาพ และการสาธารณสุข ตลอดจนในบริบทอื่นๆ บทความนี้ยังได้มีการยกตัวอย่างเกมคิดไตร่ตรอง เช่น การหลีกหนีจากเมืองดิแอป ยาพิษที่ลึกลับ และสตรีทไวซ์ และยังมีการอภิปรายอนาคต และความท้าทายของเกมคิดไตร่ตรองเพื่อการสื่อสารสุขภาพด้วยเช่นกัน

คำสำคัญ: *เกมคิดไตร่ตรอง ดิจิทัลเกม เกมมีฟิเคชัน การเปลี่ยนแปลงพฤติกรรม การสื่อสารสุขภาพ*

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Introduction

Psychologically, people are fond of something that makes them entertained, relaxed, and happy. They are even exposed to both offline and online platforms because of their entertainment-focused content strategies. I believe that people probably may be familiar with a word 'gamification' or, easily speaking, the use of an appropriate persuasive game designed for better learning and teaching. Apart from this, gamification plays a motivating function for health understanding and comprehension, persuasiveness, and health behaviour change (Institute for the Future, 2012; Lieberman, 2015; Thompson et al., 2010). Both short-term and long-term health adaptation can, at the same time, be observed.

Currently, health gamification is undervalued and underestimated (Edwards et al., 2016b) and changes in especially health-related behaviour are difficult and time-consuming. These can be reasoned by several conditions equipped with individuals internally and externally including self-efficacy, emotional involvement, decision-making process, personal skills, and so forth (Orji, Mandryk, Vassileva, & Gerling, 2013; Paredes, Tewari, & Canny, 2013).

In any sense, gamification is not even a new issue, but games in the 21st century is regarded as the first platform for the development and the betterment (McGonigal, Reality is broken, as cited in Institute for the Future, 2012). A simple and digestible rationale is that games are a technological device that are economical (Institute for the Future, 2012; Ma, 2011). The contribution goes specifically to game designers in designing more effective games, more correct health investigation, self-competence development, and health promotion between service providers and patients (Institute for the Future, 2012). As mentioned earlier, because entertainment is individuals' focal goal, it is not surprising that games are the helpers for encouraging individuals to employ health applications (Lister, West, Cannon, Sax, & Brodegard, 2014).

This paper triggered the addressing of gamification, especially serious games and its application and contribution to health behaviour change. Also, some exemplars of serious games in health are addressed. For the growth of serious games at present and in the future, last but not least, their future, challenges, and next steps are gifted.

Designing charming games for health

For making games for health attractive and effective, certainly, two parties concerning game design are game designers and game users/ players. Game designers take the responsibility in game design in a larger extent than their counterparts.

As for game designers, Giunti (2015) suggests that they should be armed with knowledge and understanding in positive psychology theories and sufficient. Not only cognitive perspectives, but also affective ones should be cultivated in game designers' blood. That is to say, stakeholders and consumer insights, or more currently, audience planning ought to be researched and heard (Fuchslocher, Niesenhaus, & Krämer, 2010; Giunti, 2015). Thompson (2012) also suggested the use of entertainment and customised communication, for example, "about me" or "for me" for self-interest and -attraction.

Fuchslocher and colleagues (2010) further elaborated that spaces and opportunities for character creation and modification and also those for challenges should be windowed up and placed for game users/players (Cugelman, 2013, see also in Institute for the future, 2012). In consideration of game users/players, to accomplish the ultimate goals of learning, self-efficacy, self-development, dialogue exchange, happiness- and relationship-building and engagement, concepts of respecting others and rewards and punishment are the nexus (Cugleman, 2013; Edwards et al., 2016a; 2016b). These can be presented in the forms of prizes, avatars, medal rewards, leaderboard, competitions,

levelling up, and health-related challenges (Edwards et al., 2016a; 2016b, see also in Cugelman, 2013; Thompson, 2012).

Techniques of game design in health

Literatures proposed different techniques of game design in health awareness, promotion, and prevention. These include exergaming (a combination of exercise and games) for physical activity (González et al., 2016; McCallum, 2012), *virtual reality* for injury rehabilitation, rehabitainment for disease management and treatment, and *cyberpsychology* for the understanding of psychological factors originated from technological uses (e.g., McCallum, 2012).

Even not addressed above, serious games are of high concern and focus in this paper. Their popularity is accepted in a greater extent since they are applied and contributed in the fields of academics, academic training, learning process, engineering, military, city planning, production, crisis management, public policy, psychology, international education, peace and conflict study, organizational study, economics, marketing, management and business, entrepreneurship, and the like (Ma, 2011). Further to this, serious games are one of the vital techniques in developing and managing individuals' health (Dias et al., 2016; Ma, 2011; Ohannessian, Yaghobian, Verger, & Vanhems, 2016), for example, decrease in widespread of neglected tropical disease (Luz, Masoodian, Cesario, & Cesario, 2016) and in helping health service providers in health intervention (Ricciardi & De Paolis, 2014). It is also emphasised that:

> '[s]erious games are best individually tailored to both socio-demographic and change need information, and benefit from a strong focus on game theories or a dual theoretical foundation in both behavioral prediction and game theories. They can be effective either as a stand-alone or multi-component programs, and appeal to populations regardless of age and gender. Given that effects of games remain heterogeneous, further explorations of which game features create larger effects are needed' (DeSmet et al., 2014).

Further discussions about similarities and differences between serious games and digital games are made in the next section.

Similarities and differences between serious games and digital games

Not only other people, but also I myself, broadly see serious games similar to digital games in breadth and in depth. While writing up this paper, I notice and discover that there is something found similar and different between serious games and other types of digital games, even gamification as a whole. From the written work of Wenk and Gobron (2017) to compare between gamification, simulation, and serious games, three dimensions, i.e. objective and goal, reality, and scope of applicability, could be discussed.

As for objective, all of them share their target to make people entertained. From a range of least to most entertaining, it starts from serious games, simulation, and gamification. Likewise, a degree of impact is relatively different. While gamification and serious games would like to reach changes in persons, simulation aims only to know people's potential, performance, or competence. Although shifts can be seen in gamification and serious games, a divergent level is likely to be given. In other words, whereas simulation triggers to 'users' motivation and engagement' (Marklund, 2015, as cited in Wenk & Gobron, 2017), 'knowledge, skills or behaviours' are the ultimate goals of serious games. It can be said that simulation is a half way to success whereas serious games can produce a destination. In terms

of reality, this reward should be fully given to simulation while the rest are likely to be constructed.

These three digital games can be applied in different scopes of study and use. Specifically for health communication, it seems to me that gamification and serious games are more appropriate than simulation. As Wenk and Gobron (2017) explained, health is a field simulation and serious games are normally employed. For learning research and practice, it should be simulation and serious games. Consequently, gamification is described in this paper, as shown above, and serious games are specifically given in more details in this paper with the reasons exhibited in the past section.

Serious games in health

Serious games are digital games that create the environment in the line between virtual reality and actual reality, and later on facilitate game users/players for participation and engagement through their stories and storytelling (Marsh, 2011). The preference of serious games aims to sharpening individuals' minds rather than to escaping from exhaustion and boredom, since through serious games, various skills and social and emotional intelligence, especially among patients with diverse symptoms of physical disorders and mental illness can be improved (Ma, 2011). McCallum (2012) further elaborated that games players/users' understanding, attitude, health capability, cognitive ability, health, and psychological health are strengthened and lighted via serious games.

Apart from the requirements from game designers highlighted above, challenges on how to design serious games especially to get people involved in serious games are of need. Building patients' understandings and skills about health and diseases (Thompson, 2012) and also motivating them for participation and engagement through 'convergence of motivations' (Drummond, Hadchouel, & Tesnière, 2017). These include external motivators (e.g., asking patients to play a 'doctor' role), learning activities (e.g., serious games that give information and knowledge on cardiopulmonary resuscitation (CPR), persuasive-made learning activities, and that, later on, can internally help people to participation and engagement (Drummond et al., 2017). Thus, there are two key approaches of thought that I would like to give in the paper, i.e. Drummond and colleagues (2017) and Wattanasoontorn (2013a). This is because they can be a good and starting platform for health professionals and health-related serious game designers to kick off future health serious games with different outcomes, simply and easily known as, the knowledge, attitude, and practice (K-A-P) theory. While the former emphasises on the first goal, all the three outcomes can be exploded by the use of the latter. However, these two thinking hats similarly respond to and is well explained by a widely used communication model of David K. Berlo, i.e. the Source-Message, Channel, Receiver (S-M-C-R) model and a two-way communication approach.

Drummer and colleagues, on the one hand, recommend four pillars of serious games for the learning betterment.

1. Attention can be divided into three levels - level 1: alerting network; level 2: orienting network; and level 3: execution network.
2. Active learning focuses on collaborative and interactive learning.
3. Feedback targets to bridging gaps between defined objectives and actual implementation and evaluating self-competence (Drummond et al., 2017) and functionality (Ohannessian et al., 2016). Ryan and colleagues (2016) discussed that although evaluation of serious games is under discussion and development, obvious evidence is important and understading serious games should be trained.

4. Consolidation refers to long-term result and memorance through repeated interaction.

On the other hand, Wattanasoontorn et al. (2013a; 2013b) explained that 1) game users/players; 2) level of epidemic disease occurrence; and 3) serious games applications are the threesome that should be considered. First goes for game users/players' status quo in terms of their 'skills and experiences' and 'health status'. Whereas skills and experiences are meant to either professionals or non-professionals, either patients or ordinary people are the two types of health status.

As for level of pandemic disease, four levels, ranging from a careful watching on health, or so-called 'disease sensitivity or health surveillance', an act of controlling one's health, or so-called 'health control', a way of healing one's unhealthiness, or so-called health treatment, to a process of returning to a healthy and good health status or so-called 'rehabilitation' are defined.

Last but not least, it is rather about technological- and machine-oriented factors. Designed serious game applications must take these following characteristics into their granted. These include 'application area', 'interaction technology', 'game interface', 'number of players', 'game genre', 'adaptability', 'performance feedback', 'progress monitoring', 'game hardware portability', 'game engine', 'platform', and 'connectivity'.

Example of health-related serious games

The following spaces enlighten people with a clearer picture of serious games in building better health. Examples of *Escape from Diab, A Mysterious Poisoning, StreetWise* are proposed.

Escape from Diab (Diab)

The serious game called 'Escape from Diab' has been developed by Archimage, Texas, in collaboration with Center of Houston's Baylor College of Medicine (Children's Nutrition Research Center of Houston's Baylor College of Medicine). The game targets to children aged between 10 and 12 years of age to escape from obesity and diabetes causing other diseases. The game also suggests low-calorie food and drink consumption and increase of physcial exercise (Scholtus, 2007; Thompson et al., 2010).

As for making children imagine and entertained, *Diab* fairy land is created and is governed by King Etes. His direction is to encourage his people to eat junk food with free of charge and discourage them to get exercised. Only one way that citizens can escape from the king's ridiculous order and from his guardians' statement is to consume healthy food and practice physical activity. The adverture is performed through five heroes, i.e. Djay, Linda, Davis, Baris Bor, and Mycer.

A Mysterious Poisoning

In Italy, the adventurous '*A mysterious poisoning*' has been developed to make people aware of and understand about risk and danger of raw milk consumption. In the game, reasons of diarrhoea must be sought for. Together with this, people can understand and know milk production and product logistics which can be contaminated as well as product safety. Although the results revealed that Italian consumers have been lacking awareness of and understanding about how to contain milk safely and manage milk product, the game can be regarded as a platform for developing future strategies (Crovato et al., 2016).

StreetWise

The goal of this StreetWise serious game is to develop skills of the patients with secure forensic mental health. It is an easy and simple game. For the game users/players, other people's perspectives explain the game details. Avatar choices indicate

level of risks and dangers. For instance, a lesser risk and danger is found in job center choice than smoke crack one. As mentioned above, evaluation is of high importance and assessment is made in this game. This game is designed to be more complex in order to monitor the game players/users' decision making and make the game more attractive. In details, there are three challenges, with more difficulty for a particular challenge. Whether or not the game players/users can pass each challenge depends on congruency, consistency, and harmony (Hodge et al., 2015).

OrderUP!

OrderUP! helps people understand how to eat for better health and enlighten their critical thinking on nutrition as well as respect to happiness evaluation, interaction with other people, and initiation on healthy consumption (Grimes, Kantroo, & Grinter, 2010).

Serious games for health: Future, challenges, and next steps

Games are a two-edged sword. To some extents, games are perceived negatively on people's behaviour, especially among the vulnerables who are lacking physical and psychological maturity. School shooting can be a good example. With any type of games, however, it helps encourage people's learning process and skill development (see e.g., Charles, Bustard, & Black, 2009; Graafland, Schraagen, & Schijven, 2012; Kang, Liu, & Qu, 2017; Ohannessian et al., 2016).

In health communication context, understanding health status, conditions, and processes is not easy to be communicated, explained, and digested. With changes in consumer behaviour, gamification, especially serious games should be taken into consideration. Limitations and proposed solutions are addressed as follows.

Firstly, although people are quite familiar with serious games, little is known and apparently comprehended. This is because a dearth of serious game research studies conducted and published regularly and in breadth and depth. To be clearly and fully acknowledged, I shall provide a direct quote from the study abstract of Kharrazi and colleagues (2012) indicating this problem that:

> 'To be included in this review, publications were required (1) to be an original research, (2) to focus on health, (3) to utilize a sound research design, (4) to report quantitative health outcomes, and (5) to target healthcare receivers. Initial findings showed certain trends in health game publications: Focus on younger male demographics, relatively low number of study participants, increased number of controlled trials, short duration of intervention periods, short duration and frequency of user–game interaction, dominance of exercise and rehab games, lack of underlying theoretical frameworks, and concentration on clinical contexts such as physical activity and nutrition. The review concludes that future research should (1) widen the demographics to include females and elderly, (2) increase the number of participants in controlled trials, (3) lengthen both the intervention period and user–game interaction duration, and (4) expand the application of health games in new clinical contexts'

Altogether with the findings of these academic scholars, not only males, from the exampled serious games, but also teenagers are focused. Following the definition of serious games presented by DeSmet et al. (2014), target audience should cover their social and demographic profiles, from gender, age, educational attainment, race and ethnicity, religious background, marital status, payment, occupation, and the like. Also, at present, health-oriented serious games predominantly limit to consumption and eating habits. As a communicator, moreover, I would suggest and recommend understanding and experiencing people's psychosocial factors including their attitude and lifestyle, or so-called consumer insights. And, predictably, boredom and existing behaviour and understanding can be repeated.

Secondly, serious games are not appropriately and well designed and constructed. In communication context. It is all about a brand communication-audience planning and consumer insights, communication objectives, content and message strategy, and evaluation. Even being addressed in theoretical perspectives, such factors are not fully practiced, nor does priority focus. That is to say, content is the king, but context is the queen. Designed and developed by scientists including computer programmers and health professionals and providers can mainly be reasoned at a glance.

Thirdly, long-term practice and engagement is unlikely to be encouraged in serious games, but short-term one is driven, instead. In communication context, sustainable endeavour and manner must unavoidably be respected. The study of Sardi and colleages (2017) revealed and confirmed that even though game users/players receive a reward from playing a game successfully, they engage in chronic disease rehabilitation, physical activity, and mental health unsustainably. Even basing upon the theoretical approach, this indicates a failure in a concept of punishment and reinforcement, especially positive rewards. Once again, it is all about designing strategic communication.

Finally, there is a lack of measuring success of health-related serious games in depth and in breadth. As for analysing from the exampled health-based serious games, there is only one game, i.e. StreetWise that has an evaluation space whereas the rest just target to make the audiences learn about the health-related topics. Nevertheless, in extent to which and how good and developed audience and other components are can hardly be known. The studies from several scholars, for instance, DeSmet et al., (2014), Emmerich and Bockholt (2016), and Alahäivälä and Oinas-Kukkonen (2016) confirm this claim. According to the research conducted by Calderon and Ruiz (2015), likewise, it is revealed that serious games evaluation is predominantly based on 'learning outcome, usability, [and] user's experience' rather than trying to changing their attitude and behaviour which can meet the requirement of long-term engagement. Apart from these, quantitative research methods with simple research process are more famous than their counterpart. This can possibly mirror failure in well and appropriate serious game design.

My personal conclusive remark is that serious games are not problematic in theoretical concepts. Practical challenges can, instead, be observed. As for the limitations addressed above, knowledge and practice in arts and science are called for. I also would like to make a short, but important concluding remark at this point that health is wealth. Otherwise, human loss before an appropriate time can be the result and that can, later, negatively cause economic loss of a country.

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