



SERIOUS GAMES IN PSYCHOTHERAPY: A COMPARATIVE ANALYSIS OF GAME DESIGN MODELS

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ABSTRACT

The use of serious games in various areas is promising these days. In the early version of digital games, it is only used as entertainment tools. To date, digital or serious games are not only utilised in education but also in training, medical, and as military simulation. The popularity of serious games has grown extensively and is broadly accepted by various age groups ranging from children to adults. Given the wide popularity and benefits that can be obtained from using serious games, this has increased the interest of researchers and health professionals to use serious games in treatments as assistive tools. Hence, the purpose of this paper is to report on an ongoing study, which intends to propose a therapeutic game design model to be used in psychotherapy. Two comparative analyses on selected models are also presented in this paper as part of the process in proposing steps or phases that can be considered in therapeutic game design model. In addition, this paper also discusses the potential of utilising serious games in psychotherapy.

Keywords: therapeutic games, adolescents, game design model.

INTRODUCTION

Mental health disorders have become a major social and economic challenge worldwide (Doherty, Coyle, & Sharry, 2012). The number of people suffering from mental illness keeps growing in recent years and has currently become a global burden. The total cost spent to improve the current mental health system is also increasing drastically today (Myhr & Payne, 2006). Hence, it is important to provide efficient and cost-effective mental health treatment and this requirement is becoming a concern for public healthcare systems all over the world (Matthews & Doherty, 2011).

Serious games can be utilised to deliver psychotherapy intervention among young patients. This is because it can attract young patients and they can immerse easily in the treatment. To date, diverse studies and therapeutic game developments have been implemented in this field to complement current psychotherapy methods. The utilisation of serious games as assistive tools is widely practised in several types of health treatments, for instance during psycho-education in chronic disease management (Ceranoglu, 2010), physical therapy (Geurts et al., 2011), and mental health psychotherapy interventions (Stallard, Velleman, & Richardson, 2010). In addition, serious games could also offer low-cost interventions as well as are effective in several mental illnesses such as anxiety, depression, mood disorders, and phobia (Fernández-Aranda et al., 2012; Newman, Szkodny, Llera, & Przeworski, 2011).

THERAPEUTIC GAMES

The use of serious games as effective tools in therapy sessions has already been proven to promote recovery, especially for adolescents. It can make them more immersed in and engaged with the treatment session (Clough & Casey, 2011; Coyle & Doherty, 2009). Several

advantages gained by utilising serious games in psychotherapy are listed below:

- i. Serious games may facilitate positive relations between therapists and patients. Therapists can also clarify existing problems easily during the treatment process (Szczesna et al., 2011).
- ii. Games allow engagement with patients and reduce stigma during treatment (Coyle et al., 2005).
- iii. Therapists could easily discover children's behaviours and skills while playing games. Serious games can also contribute to flexibility as activities and homework can be formed based on a game's concepts (Clough & Casey, 2011).
- iv. Games provide improved accessibility, greater convenience, increase privacy, and reduce embarrassment from meeting a mental health specialist while at the same time maintaining the treatment's fidelity (Stallard et al., 2010).

However, the lack of therapeutic games has led to the utilisation of regular games as therapeutic games such as using Super Mario Bros. in a psychotherapy programme to assist and assess various abilities of adolescents (Annema et al., 2010). Not only there is a lack of serious games for psychotherapy, but there is also a lack of supporting literature or specific examples in using games as psychotherapy tools (Hull, 2009; Kostoulas et al., 2012). Applying regular games in game therapy can lead to the failure in achieving the main objectives for psychotherapy session. This is because a regular game cannot fulfil the needs of target users for psychotherapeutic purposes.

In addition, most of the researchers in this area are also too focused on enabling the use of a serious game in psychotherapy but forget about the needs of target users (Alankus, Proffitt, Kelleher, & Engsborg, 2010). This can contribute to poor activities during the psychotherapy



session, which then leads to the failure in achieving the objectives in the psychotherapy session. There is also evidence that most of the researches that are involved with therapeutic games have been largely uncoordinated (Coyle et al., 2005).

Besides the lack of therapeutic game availability, there are also several other hurdles that prevent the use of therapeutic games in therapy offices such as game system requirements and low computer specifications in clinical settings to support therapeutic games. Most of the researches in therapeutic games did not fully utilise the clinical settings but remained in experimental settings (Clough & Casey, 2011). Mental health professionals also claimed that it is quite difficult for them to use therapeutic games due to a lack of familiarity and there is still no rule of thumb available in the game selection for specific illness during psychotherapy sessions (Ceranoglu, 2010; Clough & Casey, 2011). Furthermore, serious games have also received negative views where most of them are too focused on the negative impact of playing serious games such as violence. However, there is little evidence that supports this scenario (Olson, 2004). Therefore, it is important to further research on the development of serious games as an alternative approach in clinical settings.

REQUIREMENTS OF DESIGN GUIDELINES IN THERAPEUTIC GAMES

Although there are researchers who have developed their own therapeutic games for use in treatment, research in therapeutic games is still conducted in an unsystematic way. Most of the researches involved only psychotherapeutic point of view but lack contribution from the computer science area. Furthermore, there are many issues in the design process for therapeutic games (Coyle et al., 2005). It is important to develop a good game design specifically for therapy to ensure that the psychotherapy goals can be achieved for the target users. Various game design models have been proposed by a number of researchers and are available in different genres of games (Akilli & Cagiltay, 2006; Calleja, 2007; Hunicke, Leblanc, & Zubek, 2004). However, when developing serious games for psychotherapy purposes, the game developers should consider design as the main element. Design guidelines have played a critical factor in human-computer interaction (Nielsen, 1993).

As mentioned before, regular games are widely used in clinical settings. The lack of design guidelines that exists in therapeutic games also contributes to this usage. Therapeutic games are highly different from regular games, which have been designed for entertainment purposes. These two types of games also have different groups of target users and goals. The differences are not only dependent on the target users, but also on game content (Fuchslocher, Niesenhaus, & Krämer, 2011). Apparently, there is a high demand for systematic design guidelines for therapeutic games. Moreover, the design guidelines for a regular game cannot fully support the demands of a psychotherapy session. Instead, a therapeutic

game needs a specific game design methodology to ensure the objectives of the psychotherapy session can be achieved. To date, the utilization of therapeutic games has grown exponentially for various mental illnesses but the systematic guidelines for designing and developing therapeutic games are still fairly under-researched (Doherty, Coyle, & Matthews, 2010; Kostoulas et al., 2012).

METHOD

The methodology in this study involved two main activities initiated by comparative analysis on selected game design models and ended with an analysis of elements in game design models as described in Figure-1.

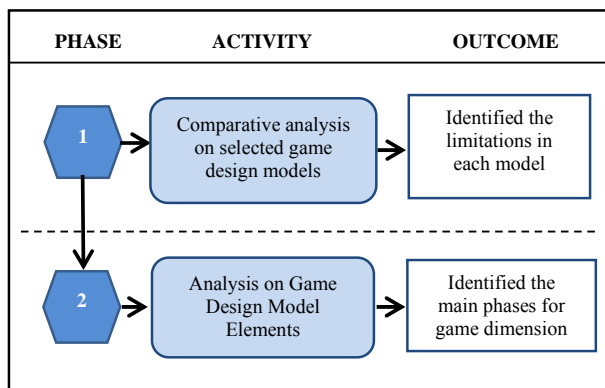


Figure-1. Methodology.

In the first phase, 10 game design models that were most relevant to this study were selected. As mentioned before, there are no existing game design models for therapeutics yet, hence in order to propose a therapeutic game design model, comparing the existing game design models could provide the suggested steps to be included in the proposed model later. A comparative analysis was carried out in this phase to identify the weaknesses and strengths of each model. Through this analysis, suggestions for required elements in gaming perspectives could be identified.

Meanwhile, in Phase 2 the expected outcome which is the main phases or activities that could contribute to the game dimension in the proposed model could be achieved by a comparative analysis of game design model elements. The next section explains in detail the process of the methodology in this study.

Phase 1: Comparative analysis of game design models

In order to develop guidelines on the design model for therapeutic games, a comparative study has been carried out. Ten game design models were selected in this comparative study to obtain the information needed. These models ranged from various types of game design models such as educational, experience, and instructional. The 10 models are listed below:



- i. Expanded game experience (EGE) model (Kultima & Stenros, 2010)
- ii. Classroom game design framework (Echeverría et al., 2011)
- iii. Serious game instructional systems design model (Kirkley, Tomblin, & Kirkley, 2005)
- iv. MDA framework (Hunicke et al., 2004)
- v. Contextual gameplay experience model (CGEM) (Engl & Nacke, 2012)
- vi. Input-process-outcome game model (Garris, Ahlers, & Driskell, 2002a)
- vii. Integrated model for educational game design (IMEGD) (Paras & Bizzocchi, 2005)
- viii. The fuzzified instructional design development of game-like environments (FIDGE) model (Akilli & Cagiltay, 2006)
- ix. SCI model (Ermi & Mäyrä, 2005)
- x. EFM model (Song & Zhang, 2008)

Table-1. Comparative analysis of game design models.

Models/Frameworks	Descriptions	Strengths/Limitations
Expanded game experience (EGE) model (Kultima & Stenros, 2010)	The model concentrates mainly on game experience as an important element during the game design process.	This model is suitable for casual and social game experiences. However, the model only concentrates on the process of game experience but does not provide any guidelines for other process in game design.
Classroom game design framework (Echeverría et al., 2011)	This model is designed for educational games and consists of two main dimensions; ludic and educational. Ludic dimension focuses on the gaming aspects that should be stressed on during game designing.	This model suggests four elements for games and it could help in designing a good game since the suggested elements are the important elements that should be in a game. However, this model could not assist in establishing positive communication between therapists. Clearly, there is no element focusing on the players in the model.
Serious game instructional systems design model (Kirkley et al., 2005)	A model born by a combination of several elements from selected models such as ADDIE, Waterfall, iterative design, rapid prototyping, and other models in order to produce a high-end level composite process.	Although this model provides the phases for game design, it does not provide clear activities that should be involved to improve the player engagement.
MDA framework (Hunicke et al., 2004)	MDA framework formalises the consumption of games by breaking them into three different components (rules, system, and fun), and then establishes their design counterparts with mechanics, dynamics, and aesthetics.	Even though MDA framework emphasises the connection between the developer and the player which is a good approach to understand the player, it is still lack of activities in producing a good serious game.
Contextual gameplay experience model (CGEM) (Engl & Nacke, 2012)	This model represents three layers of abstraction; game system's playability, player experience, and the contextual gameplay experience. The contextual gameplay experience model is utilised to understand the players in terms of cognitive and emotional. In addition, the components proposed in the model could assist in player engagement.	The suggested model emphasises several elements of game and player experience. These elements are suitable to be applied in a therapeutic game, which can capture player interest. However, this model only focuses on the components of player experiences and does not consider the specific processes of game design.
Input-process-outcome game model (Garris et al., 2002a)	The model is developed for designing instructional games, which is based on input-process-outcome. The main component in this model is the iterative game cycle involving user judgements, user behaviour, and system feedback.	Through the suggested game cycle, it can contribute to the player interest, enjoyment, involvement, and confidence in the game context. Although this model provides the elements that should be considered for designing a game, the process is not clearly described.
Integrated model for educational game design (IMEGD) (Paras & Bizzocchi, 2005)	This model involves five elements; games, play, flow, motivation, and learning. The model emphasises the combination of flow and motivation to support learning process, which is initiated by games that foster play.	This model involves the elements that could be adopted to improve the player engagement in psychotherapy but the process involved for designing a game content is not included.
The fuzzified instructional design development of game-like environments (FIDGE) model (Akilli & Cagiltay, 2006)	The model is based on dynamic and concept of fuzzy logic that focuses on non-linear process. In addition, the model combines the design principle and instructional principle since the model is developed for educational games.	The steps in the process of designing a game are not clearly defined.
SCI model (Ermi & Mäyrä, 2005)	The SCI model is derived from sensory, challenge, and imaginative immersion. This model also involves several elements of gameplay experience, which is more focused	This model is good to establish positive interaction between therapists and patients in mental health treatments. This is because this model also considers the elements of player (motorics, cognitions, and



	on the use of immersion.	emotions). However, this model lacks the guidelines for designers to design a good game.
EFM model (Song & Zhang, 2008)	The EFM model is solely developed as a guideline for educational games. This model suggests four main phases, which are effective learning environment, educational game, flow experience, and motivation.	The suggested model could provide effective learning environment by adopting nine components of flow experience and four strategies to boost up the motivation. These elements could be embedded in the proposed therapeutic game since it can help to provide effective psychotherapy environment. In the aspect of game content design, this model does not clearly define the essential steps that need to be considered.

When considering the aspect of engagement as a part of the guidelines in therapeutic games, five models were selected to fulfil this criterion; EGE, CGEM, IMEGD, SCI, and EFM. Initially, the EGE model has been introduced in two versions. The EGE model is very suitable for casual and social game experiences. This model mainly concentrates on game experience as an important element during the game design process. The final version of this model was presented in a more systematic way, focusing on the user's state in each level without ignoring design rules. This model gives opportunities for the game designers in understanding the players when designing a game. Thus, this model was selected to support the elements of engagement when patients are playing therapeutic games. The second model selected in the aspect of engagement is the CGEM. Engl and Nacke (2012) have proposed a design model that focuses on player and game experience in serious games. Although this model is developed for mobile experience, it could support various game platforms.

IMEGD suggests the use of Csikszentmihalyi's flow theory as a medium for understanding and implementing motivation in educational game environment. Flow theory could connect the instructional design and motivational design theory, hence could support the learning experience. Meanwhile, the SCI model is developed based on observation among game-playing children and non-player parents, which then leads the researchers to the nature of gameplay experience. The final model that was selected to support engagement in psychotherapy is the EFM model. This model is designed especially for educational purpose through linking the internal connection of motivation, flow, effective learning environment, and educational games. Similar with IMEGD, this model also utilises flow theory to support player motivation in the game.

Another five models were selected to provide basic guidelines in designing and developing therapeutic games; classroom game design framework, serious game instructional systems design model, MDA framework, input-process-outcome game model, and FIDGE model. Classroom game design framework provides the basic game elements that should be considered by the game designers. The model also supports the classroom multiplayer games. Serious game instructional systems design model combines the elements of game design and

instructional design in a model. Thus, this model could assist instructional designers and game designers as well.

MDA framework formalises the consumption of games by breaking them into three different components (rules, system, and fun), and then establishes their design counterparts with mechanics, dynamics, and aesthetics. Input-process-outcome game model may also support instructional designers in designing serious games while integrating selected features or characteristics of games. The FIDGE model has similar components as the traditional models but this model is structured in a different way. The model involves several dynamic phases that utilise fuzzy boundaries and support instructional designers in a non-linear manner.

Thus, considering and analysing elements that exist in 10 selected models could assist this study as part of the process in proposing a therapeutic game design model. The summary of comparative analysis for each model is tabulated and exhibited in Table 1. This comparative analysis was performed to identify the strengths and limitations of each model. Therefore, the selection of required elements would be easy to execute.

Phase 2: Analysis of game design models elements

In this phase, an analysis of elements that exist in each model was conducted in order to identify the essential elements that should be in the proposed design model. Elements with similarities to each other were listed out as considered elements and categorised into five main elements as shown in Table-2.

Based on the analysis, three models identified have similarities on Analysis elements. The analysis varied from various aspects such as player, need analysis, game analysis, and content analysis. Models suggested by Hunicke et al. (2004), Ermi & Mäyrä, (2005) and Echeverría et al. (2011) also have commonalities in game elements. Game mechanics, rules, and game story are listed under game elements. Meanwhile, game aesthetics is suggested by nine models; (Akilli & Cagiltay, 2006); (Echeverría et al., 2011); (Engl & Nacke, 2012); (Garris, Ahlers, & Driskell, 2002b); (Hunicke et al., 2004); (Kirkley et al., 2005); (Kultima & Stenros, 2010); (Paras & Bizzocchi, 2005); (Song & Zhang, 2008). This strengthens the needs to include game aesthetics in the proposed model. Four out of 10 models suggest player experience to improve the engagement level. The



significance to comprise the process of evaluation is stressed by Akilli and Cagiltay (2006) and Kirkley et al. (2005). It is relevant to adopt this element and thus

evaluation from the beginning until the end is necessary to find defects during the designing process.

Table-2. Analysis of game design model elements.

CATEGORY	Analysis	Game elements	Game aesthetics	Player experience	Evaluation
Model	<ul style="list-style-type: none"> (Kultima & Stenros, 2010) (Akilli & Cagiltay, 2006) (Kirkley et al., 2005) 	<ul style="list-style-type: none"> (Echeverría et al., 2011) (Hunicke et al., 2004) (Ermi & Mäyrä, 2005) 	<ul style="list-style-type: none"> (Kultima & Stenros, 2010) (Song & Zhang, 2008) (Akilli & Cagiltay, 2006) (Kirkley et al., 2005) (Echeverría et al., 2011) (Hunicke et al., 2004) (Engl & Nacke, 2012) (Garris et al., 2002b) (Paras & Bizzocchi, 2005) 	<ul style="list-style-type: none"> (Ermi & Mäyrä, 2005) (Engl & Nacke, 2012) (Paras & Bizzocchi, 2005) (Song & Zhang, 2008) 	<ul style="list-style-type: none"> (Akilli & Cagiltay, 2006) (Kirkley et al., 2005)

FINDINGS AND DISCUSSIONS

This section presents the findings achieved in Phase 1 and Phase 2 based on the methodology performed in this study. In Phase 1, a comparative analysis on 10 selected models leads to the findings of identifying the strengths and limitations in each model. Identifying these characteristics could assist the study in adopting essential characteristics into the proposed model later. Combining the strengths from these models could enhance the effectiveness of the proposed model.

Based on the outcome in Phase 2, it is suggested that the main phases that could be considered for the proposed therapeutic model are Analysis, Game Elements, Game Aesthetics, Player Experience, and Evaluation. These main phases cover almost all elements in the 10 selected models that were discussed in the methodology section. Analysis will require the designers to obtain reliable data about the players (patients) and subjects (type of mental illness) before starting to design a therapeutic game. Meanwhile, game elements, game aesthetics, and player experience will focus on the game content and how to engage the patients through player experience. Evaluation is needed to evaluate the overall process of designing from the beginning until the end.

FUTURE WORKS AND CONCLUSIONS

Based on the findings derived from this study, it will guide this study in determining the additional elements for every main phase that have been suggested previously. Comparative analysis on therapeutic model is also vital and should be conducted as well. This step will identify the psychotherapy approach to be embedded into the proposed model as the therapeutic dimension.

Existing researches have shown methodological weakness in therapeutic games and there is a strong evidence for future work to provide more guidelines for game design and development to support specific illnesses using therapeutic games (Doherty et al., 2010; Kostoulas et al., 2012). Although there are many works related to psychotherapy games, to date, research in this area is still lacking and there has only been a limited number of research projects on game design. Therefore, it is necessary to develop a specific game design methodology for therapeutic purposes.

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