

Designing Effective Exergames for Muscular Strength

Kim sang jung¹

¹ 389-94, ChungKang College of Cultural Industries, Chungkang
gachang-ro, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
happygo51@daum.net

Abstract. The widely spread exergames advertise in providing health benefits through entertainment. However the effectiveness of those in essence is questionable. This paper aims to observe muscular strength amongst others, which if proven effective, or otherwise, it will set out to identify factors associated with it, and to design more effective exergames for muscular strength in the extent to which basic criteria and factors must be met and considered.

Keywords: Serious Game, Motion-based game, Physical Game, Full-body-experience video game, motion sensing game.

1 Introduction

A game that is specially designed for a specific purpose, not of entertainment, with interactive entertaining factors is known as serious games. The idea was first described in the book "Serious games" by a social scientist, Clark C. Abt, in 1977 [1].

Arguably, serious games that undertake functional role have extremely high growth possibility, especially when controversial social dysfunction is prevalent from induced excessive use of games including excessive immersion phenomenon, violence, gambling, inflaming, and others. This is due to huge increase in potential of serious games utilization from national level of support, and on various attempts with regards to developing functional factors and serious games. A video gaming website Game Spot has viewed that according to a recent report released by research firm Gartner Inc., total worldwide video game sales for 2013 will reach \$93 billion, and is expected to rise further to \$111 billion by 2015 where video game market will continue to grow, in its article "Worldwide industry sales to reach \$93 billion in 2013" released on October 29, 2013 [2].

Comparable to such continued growth, number of motion sensing console-based games are being released, i.e. exergames. Research showed that video game console devices such as Nintendo's Wii, Microsoft's Xbox Kinect, and Sony's PlayStation®Move were most popular. Therefore it provided ample opportunities to observe the workings of the devices from playing motion sensing games. In order to evidence the effect of these exergames, a study was conducted by researchers at Baylor College of Medicine in Houston, Texas. The study selected 78 children between the ages of 9 to 12 where half of them were assigned to a group playing

exergames (Wii Sports or Dance Dance Revolution, for instance), and other half assigned to playing games that did not require activity (Super Mario Galaxy, for instance) over a 13-week period. The study concluded that there was no evidence to suggest that there is a difference in physical activity between the two groups, and this complete lack of difference shocked researchers, Tom Baranowski, Ph.D. among them [3].

Reuters also reported that although it cannot replace the needed exercise it might be beneficial than not exercising at all, quoting other researcher in the study. Ultimately, such result may be interpreted, in that it is pertinent to game design. Then what is there to be done to design effectively? This paper suggests the design model next limiting in muscular strength.

2 Design model

Number of users continues to be caught in a vicious circle of playing exergames; getting disappointed with lack of results, getting frustrated over strenuous exercise and readily giving up, which many attempt to try taking in advertisements of various motion sensing games.

In other words, it is required to be designed so that the practical effect is given. With what certain factors should it be designed is observed next. First, the essence of game is fun. A game designer and science fiction writer Greg Costikyan defines game as “a form of art in which participants, termed players, make decisions in order to manage resources through game tokens in the pursuit of a goal” in his article <I have no words & I must design> [4].

Game is a means to active participation and selection, resource management, and carrying out decisions, which game tokens and game objectives are the key elements. Second, a step-by-step plan is required in order to apply muscular exercise. It is essential to progress with step-by-step applicable exercise plans.

A step-by-step plan that is easily adaptable to prevent and/or recover musculoskeletal disorders from warm-up to, and through, progressively advancing stages is required. (Keng-Sik Yan 2011) [5] Third, In-Young Se (2012) [6] experimented and witnessed improvements in health and daily performance, and decrease in depression of institutionalized elderly women from a 10-week lower extremity strengthening exercise program. Accordingly, she states that to elders who are psychologically withered and whose health deteriorating, such exercise program could be suggested as a nursing intervention program that increases quality of life, for example, preventing disorders or improving functions, helping to increase physical activity and to participate in social activity, and giving emotional stability. Fourth and final, Dong Hee Lee (2011) concluded in his experiment that there is no significant correlation between the flexibility and the lower limb strength where he was observing the extent of the correlation of the two [7].

3 Conclusion

In Arguably, continued effect in exergames is only achievable if the most important factor of a game, fun, is present. First, it needs to be designed so that a user is able to actively participate and select in game, able to utilize items, and accomplish a sense of achievement on both means and objectives, and this may be done by gaining insight into the relationship between human needs and games. Second, it needs to be designed so that a user is able to continuously play while not having been overstrained by the process, and this may be done by adjusting game levels so that it advances gradually. Third, designing exergames of strengthening lower limb strength needs to take priority in the continued participation in games, as strengthening lower limb strength can improve health and daily performance, and decrease depression, which all of the effects have been experimented and proven, not to mention the extensive study materials available. Lastly, evidence suggests that the reason for existing motion sensing games to be not as effective is with the lack of focus in goal and for which part that it needs to be designed. Correspondingly if an exergame is to have a purpose in strengthening muscular strength it is advised that it needs to be designed to fit the purpose in order to obtain desired effects.

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