THE EFFECT OF MOTION DETECTING COMPUTER GAMES ON THE SKILLS TRAINING

Murat ELİÖZ[1]

Vedat ERİM[1]

Hamza KÜÇÜK[1]

Fatih KARAKAŞ[2]

ABSTRACT

The aim of this study is to investigate the effects of motion detecting computer games on gun shooting skills. A total of 40 men- 20 in the control group and 20 in the experiment group- and a total of 30 women- 15 in the control group and 15 in the experiment group- have joined. The experiment group played computer games three days a week for 30-45 minutes. As a result of the analysis made, a significant difference has been detected between the post-test results of both groups. It has been found out that experiment groups achieved higher results than the control groups in both genders. As a result, it has been established that motion detecting computer games increase the hitting scores. It can be interpreted as a positive transfer of skills exercises in situations that require skills. Based on the results of this study, it can be useful to benefit from computer-supported game programs in long-term exercise and in the teaching of basic skills.

Keywords: Computer game, Gunshot, Skill

HAREKET ALGILAYICI BİLGİSAYAR OYUNLARININ BECERİ ÖĞRETİMİNE ETKİSİ

ÖZET

Bu çalışmanın amacı hareket algılayıcı bilgisayar oyunlarının silah atış becerisine etkisinin araştırılmasıdır. Araştırmaya 20 kontrol, 20 çalışma grubu olmak üzere 40 erkek ve 15 kontrol 15 de çalışma grubunu oluşturan 30 kadın katılmıştır. Çalışma grubu haftada 3 gün, günde 30-45 dakika bilgisayar oyunu oynamıştır. Yapılan analiz neticesine bütün gruplarda son test sonuçları bakımından anlamlı fark tespit edilmiştir. Bunula birlikte her iki cinsiyette de çalışma gruplarının kontrol gruplarından istatistiki olarak daha yüksek puanlara ulaştığı tespit edilmiştir. Sonuç olarak bilgisayar destekli hareket algılayıcı oyunların isabet puanlarını arttırdığı bulunmuştur. Bu durum beceri gerektiren durumlarda farklı beceri çalışmalarının olumlu aktarılması olarak yorumlanabilir. Bu çalışma verilerinin sonucuna göre, uzun süreli çalışmalarda ve temel tekniklerin öğretiminde bilgisayar destekli oyun programlarının kullanılmasının faydalı olacağı düşünülmektedir.

Anahtar kelimeler: Beceri, Bilgisayar oyunu, Silah atışı

[1] Ondokuz Mayıs Üniversitesi - Yaşar Doğu Spor Bilimleri Fakültesi

[2] Ondokuz Mayıs Üniversitesi - Çarşamba Ticaret Borsası Meslek Yüksekokulu

INTRODUCTION

The increase in technological developments influences our habits in our daily life, too. While this influence is sometimes in the form of easing things, sometimes it is in the form of doing things with different methods. As a result of these developments, an increase can be seen in the types and features of computer supported games. Kinect, one of the new generation game consoles, is software developed by Microsoft. The most outstanding feature of this console is sensing people's gestures and turning these into motion. Kinect, which began to work with X-box game consoles later, fulfils the duty of control in computer games (Hua and Bin, 2011).

In new Technologies which are called gesture based computing, very fast developments have taken place in transferring human gestures to digital media (Johnson et al., 2011). The most important process in gesture based computing are gestures being recognized by the computer and controlling the computer or game consoles. The gestures are sensed through camera and sensors and the directions are interpreted by the computer (Jung and Cha, 2010).

With the developments in computer software, computer graphics have begun to be used in different areas (Uğur, 2002). Although 3-D computing are not used in all areas of our lives, they are used in a great number of areas such as "Science and Scientific Visualization", "Computer supported Design and Computer supported production", "Education and Training", "Entertainment, Advertising, Art, Virtual Reality and Reinforced Reality" (Kalaycı and Uğur, 2005). Virtual reality is a 3-D identification model, which gives a feeling of reality to participants and allows them to interact with each other in a dynamic environment created by the computer (Bayraktar and Kaleli, 2007).

In other words, virtual reality is creating the feeling of being in a real environment which is formed in the mind through 3-D graphics and pictures created by the computer. Thus, it can also be expressed as the technology which interacts with virtual objects in the environment (Cavaş et al., 2004).

Physical activities have also been positively influenced by interaction applications. One of these activities is the video games (Vaghetti and Botelho, 2010). Especially in recent years, physical activity comes to the forefront a lot (Jago and Baranowski, 2004). Some games have been found to focus on players' motoric features by combining motion technologies and virtual reality (Pasco et al., 2010).

The purpose of this study, which was conducted by using virtual reality technology and video assisted game applications, was to examine the effects of motion based games on skills development.

MATERIAL and METHOD

A total of 40 men, 20 in the control group and 20 in experiment group, and 30 women, 15 in the control group and 15 in experiment group, participated in the study. Both groups were given basic information about shooting practice 4 hours a week for four months. The participants were asked to make 15 shots in pre-test stage and their hit scores were added at the end of shooting. The experiment group played motion based dart game 30 minutes a day for three days a week after the first shooting. Both groups got a shooting practice 2 hours a week until the last test and shot 15 times a week. In addition to this, the experiment group played motion based dart game 30 minutes a day for three days a week.

Before the data analysis was started, normality assumption was checked with Shapiro-Wilk Test and since the data

were normally distributed, parametric analysis method was used. In data analysis, Paired Sample T Test was used for dependent groups while Independent Sample T Test was used for independent groups.

FINDINGS

Table 1. Pre-test and post-test results of the groups that played video game

Groups	n	Mean ± S.D.	Min-Max	p
Men Pre-test	20	65.95±13.64	46-90	<0.01
Men Post-test	20	127.8±12.23	101-147	
Women Pre-test	15	67.6±15.8	27-91	<0.01
Women Post-test	15	129.2±11.35	104-140	

The average pre-test scores of men participants was 65.95±13.64, while their average post-test scores was 127.8±12.23. The average pre-test scores of women participants was 67.6±15.8, while their average post-test scores was129.2±11.35. Significant difference was found when the pre-test and post-test values of men and women participants were compared (p<0.01).

Table 2. Pre-test and post-test results of the groups that didn't play video game

Groups	n	Mean ±S.D.	Min-Max	p
Men First Shoot	20	77.95±12.91	52-96	<0.01
Men Last Shoot	20	114.1±18.37	67-144	
Women First Shoot	15	71.33±15.68	47-95	0.002
Women Last Shoot	15	95.87±27.11	37-136	

The average pre-test scores of men who did not play video game was, 77.95±12.91 while their average post-test scores was 114.1±18.37. The average pre-test scores of women who did not play video game was 71.33±115.68, while their average post-test scores was 95.87±27.11. Significant difference was found when the pre-test and post-test values of men and women participants were compared (p<0.01).

Table 3. The comparison of average post-test scores of men experiment and control groups

Groups	n	Mean.±S.D.	Min-Max	% Improvement	p
Men Experiment Group	20	127.8±12.23	101-147	%93.7	0.009
Men Control Group	20	114.1±18.37	67-144	%46.3	

Average shooting scores of men experiment group was 127.8±12.23, while average shooting scores of men control group was114.1±18.37, and a significant difference was found between the two groups in favor of the control group (p=0.009).

Table 4. The comparison of average post-test scores of women experiment and control groups

Groups	n	Mean.±S.D.	Min-Max	% Improvement	p
Women Experiment Group	15	129.2±11.36	104-140	%91,1	<0.001
Women Control Group	15	95.87±27.11	37-136	%34,4	

Average shooting scores of women experiment group was 129.2±11.36,while average shooting scores of men control group was 95.87±27.11,and a significant difference was found between the two groups in favor of the control group (p<0.001).

DISCUSSION

Developing a skill up to the top level is associated with the target achievement and resulting performance. Thus, teaching a skill is as important as acquiring a skill. In addition, while determining the performance limits of athletes is quite important, a multifaceted assessment of performance is also important (Özkara, 2002). This study, which examines the effects of motion detecting computer games on skills development, analyses the influence of different practices on skills and performance.

According to Matwejew, activities which aim motoric learning are called sportive training in terms of training science; conditional features such as speed, strength, endurance are stated as motoric learning tools (Matwejew,1981). Thus, technical learning is closely associated with motoric learning (Özkara, 2004). Our study designed a practice which required different kinds of and similar motoric skills in order to develop shooting skills. In this design, the use of video games for different purposes rather than playing games was made use of. Yao-Jen et al. (2011) used Kinect for rehabilitation purposes and they recorded the development of physical motions they made. With the practices they made, they provided a continuous control of movements. They showed that by increasing exercise performance in significant interference stages realized this way, motivation was increased for physical rehabilitation. Süzen and Taşdelen (2013) brought a different way of use to computer practices with Kinect's ability to sense human gestures and they developed a piano design. As can be seen from these studies, Kinect is used in different areas. In their 8-week-long study they conducted on 30 people, İmamoğlu et al. (2014) found a significant increase in the hit scores of participants who played dart with Kinec. The results of their study are in parallel with our results.

Telli (2009), who conducted a study to determine the effects of 3-D art materials on the attitudes of prospective teachers toward their success in computer courses and computer assisted teaching, found that prospective teachers who learned with the help of web page which contained 3-D art materials were more successful than prospective teachers who learned with the help of the same web site but without 3-D art materials at the end of the process. In a study conducted on 41 students, Kim (2006) found that learning in a science lesson which used 3-D simulations gave better results than 2-D learning. Significant difference was found in our study between the control group and the experiment group (p<0,01). This result is in parallel with the studies in literature.

In a study they conducted on a group which played bowling, Dörrfuß et al. (2012) found that the group which had extra practices with Nintendo Wii increased their scores. Miller et al. (2012) also compared the skills acquired by playing Nintendo Wii with the skills acquired by playing real game. They found that the group which played regular bowling had higher scores during actual game than the group that played bowling with Nintendo Wii. This result is in parallel with the result of our study that the group which did not play games but only shot developed their skills while the group which practiced with Kinect had higher scores. According to this result, it can be said that in activities which require skill acquisition, only computer games are not useful. For sports which require long practices, Kinect can be recommended as a supportive study model.

According to the results of our study, significant difference was found in control and experiment groups. Improvements were seen in both groups. This improvement may have been caused by the shooting training they received. However, when the development between the control group and the experiment group was examined, the significant difference in favor of the experiment group is important. This result can be explained with the effect of games played with Kinect. In other words, Kinetic reinforced skill development more.

Bideau et al. (2004) examined the moves of handball goalkeepers by using visual systems and found similarities between the moves made by using real ball. This study and our study can be presented as supportive alternative model studies for skills development.

Using different methods to develop a skill can be useful in terms of preventing monotonousness in trainings. Pinheiroa et al. (2012) stated that they developed a simulator for F 16 motor used and the simulators used increased technical training. Belfiori (2014) used Kinect in patients who had stroke to get motion and stated that it was useful in getting back the motions lost. When the results which are in parallel with the literature are examined, it is possible to talk about the positive transfer of a skill learned in different fields to a different field.

CONCLUSION

As a conclusion, it can be said that gesture based computer games contribute to skills development. According to the results of this study, the use of gesture based computer games as different training methods are required in branches which require repetition of movements. Gesture based computer consoles can be used for branches which require long term training in order to prevent monotonousness and to make training period more effective.

REFERENCES

1. Hua H, Bin LYC., "Interaction System of Treadmill Games based on Depth Maps and CAM-Shif", Huazhong University of Science and Technology, China, 2011.

2. Johnson L, Smith R, Willis H, Levine A, Haywood K., "The 2011 Horizon Report, Texas: The New Media Consortium", Austin, 2011.

3. Jung Y, Cha B., "Gesture recognition based on motion inertial sensors for ubiquitous interactive game Contents", IETE Technical Review, 27(2)s.158-166,2010.

4. Uğur A., "İnternet Üzerinde Üç Boyut ve Web3D Teknolojileri VIII. Türkiye'de İnternet Konferansı (INET-TR) İstanbul, Türkiye, 2002. [In Turkish]

5. Kalaycı TE, Uğur A., "X3D ile İnternet Üzerinde Üç Boyut". Akademik Bilişim 2005 (AB '05), Gaziantep, Türkiye, 2005. [In Turkish]

6. Bayraktar E, Kaleli F., "Sanal Gerçeklik ve Uygulama Alanları". Akademik Bilişim Dumlupınar Üniversitesi, Kütahya, 2007. [In Turkish]

7. Çavas B, Çavas P, Can B., "Eğitimde sanal gerçeklik". The Turkish Online Journal of Educational Technology – TOJET, 3(4),2004.

8. Vaghetti CAO, Botelho SSD., "Virtual learning environments in physical education: a review of the use of Exergames," Ciências & Cognição, 15. pp.76-88,2010.

9. Jago R, Baranowski T., "Non-curricular approaches for increasing physical activity in youth: A review", Preventive Medicine, 39.pp.157-163,2004.

10. Pasco D, Bossard C, Buche C, Kermarrec G., "Using Exergames to Promote Physical Activity: A Literature Review", Sport Science Review, 9.pp.77-93,2010.

11. Özkara A., "Futbolda Testler", İlksan Matbaacılık, Ankara, 2002. [In Turkish]

12. Matwejew LP., "Grundlagen des Sportlich Trainings", Berlin, 1981.

13. Özkara A., "Futbolda Testler ve Özel Çalışmalar", Kuşçu Etiket ve Matbaacılık, Ankara, 2004. [In Turkish]

14. Yao-Jen C, Shu-Fang C, Jun-Da H., "A Kinect-based system for physical rehabilitation: A pilot study for young adults with motor disabilities", Research in Developmental Disabilities, 2011.

15. Süzen AA, Taşdelen K., "Microsoft Kinect ile Örnek Bir Uygulama: Piyano". Akademik Bilişim Konferansı, Antalya, 23-25 Ocak 2013. [In Turkish]

16. İmamoğlu M, Çebi M, Eliöz M, Atan T., "Hareket Kontrollü Aktif Oyunların Hedef Algısı Üzerine Etkisi",

6. International Congress of Educational Research, 5-8 Haziran 2014,ss.904-910. [In Turkish]

17. Telli E., "Üç boyutlu sanal materyallerin öğretmen adaylarının bilgisayar dersindeki başarılarına ve bilgisayar destekli öğretime yönelik tutumlarına etkisi", Yüksek Lisans Tezi, Atatürk Üniversitesi, Fen Bilimleri Enstitüsü, Erzurum, 2009. [In Turkish]

18. Paul Kim., "Effects of 3D virtual reality of plate tectonics on fifth grade students' achievement and attitude toward science", Interactive Learning Environments, (14)1;pp.25-34,2006.

19. Dörrfuß K, Bader F, Wegener R, Siemon A, Schwake JU, Hofman F, Schmid U., "Video games can improve performance in sports: An empirical study with Wii Sports Bowling", Seminar Human Computer Interaction, 2008.

20. Miller RM, Tsui YH, Dearden T, Wolthuis SL, Stanley T., "Learning and human computer interactions: Does Wii bowling transfer to real bowling". Retrieved October,14 (2010): 2012.

21. Bideau B, Multon F, Kulpa R, Fradet L, Arnaldi B., "Virtual reality applied to sports: do handball goalkeepers react realistically to simulated synthetic opponents?". In Proceedings of the 2004 ACM SIGGRAPH international conference on Virtual Reality continuum and its applications in industry, pp.210-216,2004.

22. Pinheiroa A, Fernandesa P, Maiab A, Cruzb G, Pedrosac D, Fonsecad B, Paredesd H, Martinsd P, Morgadod L, Rafaele J., "Development of a mechanical maintenance training simulator in OpenSimulator for F-16 aircraft engines", Procedia Computer Science, 15, 2012.

23. Beliıori A., "A new approach to Microsoft Kinect for neuro-motor rehabilitation of the upper body". Master Thesis, Bioingegneria Elettronica E Informatica, Milano, 2014.