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A research on civil engineering students' past video game playing experiences

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Abstract
Within the scope of this paper, past video game playing experiences of civil engineering students is investigated in order to identify the most preferred video game classifications that were played as an engineer candidate and its contribution to their education. A questionnaire practice is chosen and questions are randomly distributed to the civil engineering students. This technique is applied to 200 civil engineer candidates to figure out their past video game preferences before becoming a member of civil engineering department. The analysis of the questionnaire results indicates that the top three game classes in the interest of civil engineering students are: Strategy, Sports and Simulation. On the other hand, it is also observed that the less played genres are: Art Games, Action – Adventure and music games. Furthermore, results of the analysis are compared with the students weighted points. Outcomes are striking that there is a stable correlation between the students playing strategy games and their success points.

Keywords: Video games, video game genres, students, civil engineering students, past video experiences.

1. Introduction

Video Games (Vg) have progressively been preferred as indispensable and stable part of human life in today's world. Various genres [1] (Table-1) of Vg are played by people in order to be relaxed and to spend their spare time, which in turn leads to improvement in human behavior, daily life and professional skills. For instance, some researches declare that there is a strong correlation between gaming and surgeons' laparoscopic and endoscopic skills [2-7]. Besides hand skills benefits, playing a video games can improve other human skills acting as perceptual and cognitive [8], flight performance [9], and various attentional and working memory skills [10]. This is because of the fact that playing Vg requires not only a keyboard and mouse but also the skills such as hand-operated dexterity within the basis of controlling three dimensional objects by virtue of a screen.

As the scope of this study, to investigate the effect of playing so-called strategy video games to the civil engineering education, one should focus on the loyal gaming experiences of students. In order to find out the relationship between the points of success of civil engineering students and their past gaming background, a randomly distributed questionnaire method is applied to 200 civil engineering students. In the light of results obtained, it can be concluded that it will be a good idea to include the gaming based education systems in civil engineering formation. This study can also be considered as a motivation tool for creating awareness concerning the future plans of game development studios and all educators.

2.Literature review

Vg have been developing for people to have funny times; however, their effect to human behaviour and skills are not very clear. Various researches have reviewed those consequences of the game play habit [11,12]. Some of this studies have mentioned the negative impacts such as negative behaviour and adverse cognitions on the human body and daily life [13]. On the other hand, other studies have indicated some advantages of video game playing just as analytical action skills of human brains [14,15]. As mentioned before there is not a certain decision for Vg usefulness. Nevertheless, some deep investigations have indicated the improvement in

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visual capabilities [16-19] and fussy attention [20-22]. The requirements of being a reputable civil engineers likewise comprises the personnel skills: sharp visual ones and selective attention capabilities. Those skills can be improved by playing computer games that involves brain storming and decision making scenes.

Table 1. Video Games Genres [1]

Action	Platform Games, First Person Shooter Games and The other shooter games, Beat them ups.
Action- Adventure	Stealth Game, Survival Horror, Metroidvania
Adventure	Text Adventures, Graphic Adventures, Visual Novels, Interactive movie, Real-time 3-D adventure
Role Playing	Action RPGs, MMORPGs, Roguelikes, Tactical RPGs, Sandbox RPGs, Fantasy etc.
Simulation	Construction and management simulation, life simulation, vehicle simulation
Strategy	4x Game, Artillery game, RTS, MMORTS, Real-time tactics, Tower defense, Turn-based strategy, turn-based tactics, wargame
Sports	Racing, Sports game, Competitive, sports-based fighting
Others	MMOGs, Casual Game, Serious Game, etc…

Figure 1. Construction simulator [23].

There are discrete amount of game studios that produce games like afore mentioned scenes and contents [23-24]. More alike games should be improved for effective educational systems of civil engineering and other engineering disciplines; because, Vg based educational system integrated with in structural content offers great advantages [25]. Alike methods have been studied by Business development scientist and remarkable results were obtained as forcing students to think about processes in new manners, and changing their learning of context and their interactions with each other [26-27].

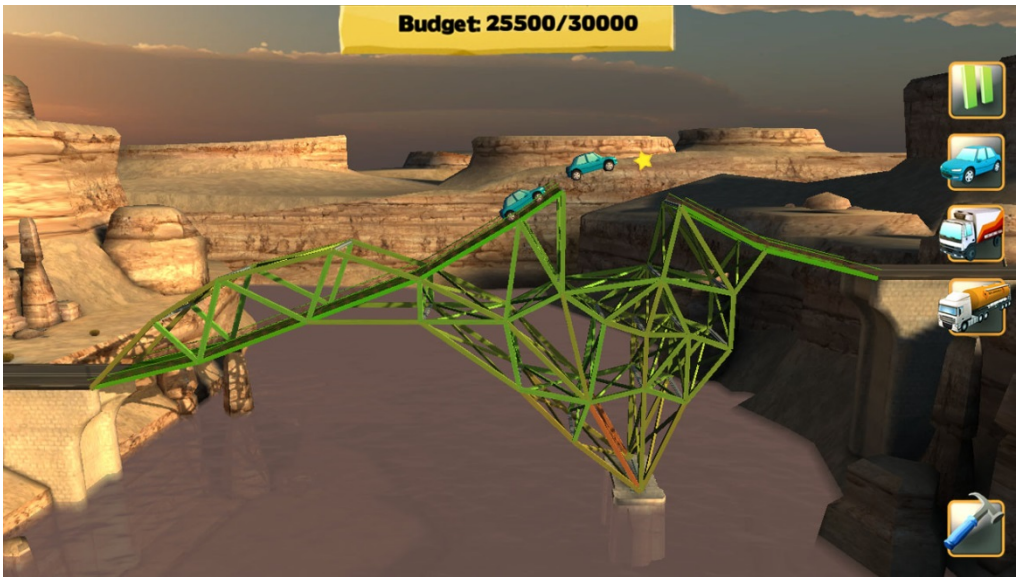

Figure 2. Bridge constructor [24].

3. Research method

Topic relevant research articles and reports were collected and evaluated. 6 main game genres as Action-Adventure, Strategy, Sports, Art Games, Simulation and Music games were considered depending on the literature view and integrated with the questionnaire design (Figure-3). The questionnaire was applied to 200 civil engineering students. Participants were filled the forms and reflected their opinions concerning the gaming behaviour and success point questions. Student belonging personal information as Name, Surname and Student ids are changed in Figure-3 as per the security policies of the university.

Item No	Name	Surname	Student ID	Gender	Game Gender Choice	Succes Points (..... / 4.00)
1	BERKAY	YILMAZ	xxx03003x	Male	Strategy	2.98
2	BURAK	BEKTAS	xxx04003x	Male	Strategy	2.77
3	OSMAN	BERBEROĞLU	xxx03003x	Male	Sports	3.14
4	GIZEM	OZIL	xxx03003x	Female	Simulation	2.87
5	AZIZ	YAKAR	xxx03003x	Male	Simulation	2.69
6	ELVAN	ÇALAYIR	xxx03003x	Female	Art Games	2.34
7	MEHMET ALI	YURTSEVEN	xxx03003x	Male	Action-Adventure	2.56

Figure 3. The questionnaire design.

Previously to statistical analysis, the questionnaire results are classified by the aid of pie charts. Participant quantity, gamer quantity, game gender choice percentages outcomes are reflected as follows (Figure-4, Figure-5, Figure-6, Figure-7 and Figure-8):

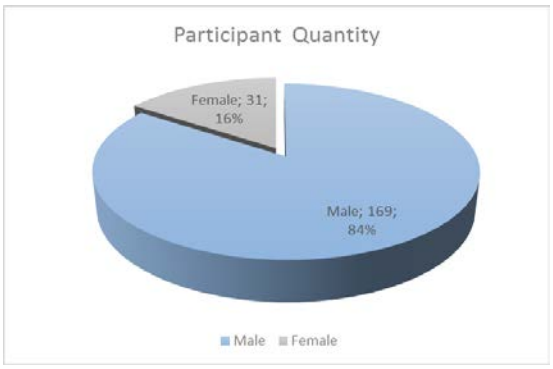

Figure 4. Participant quantity.

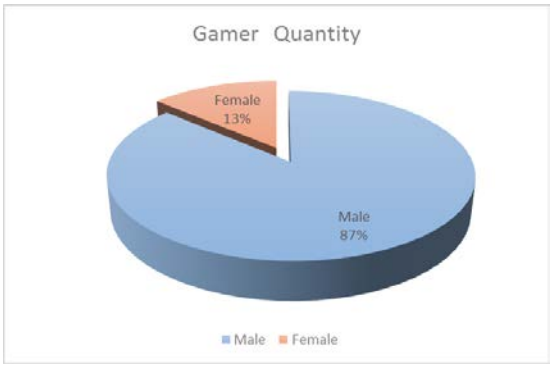

Figure 5. Participant gender.

Figure 6. Males' choices.

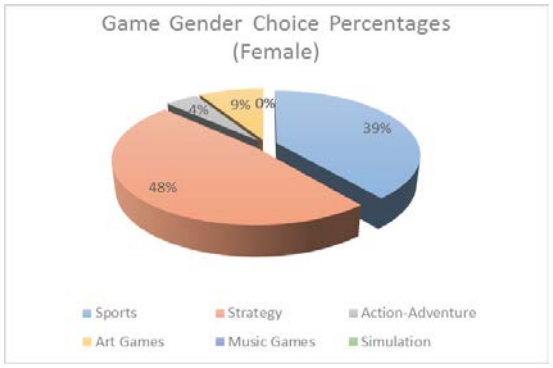

Figure 7. Females' choices.

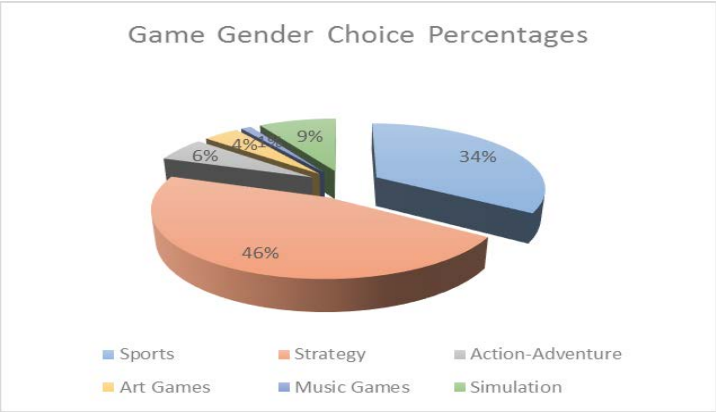

Figure 8. Game gender choice percentages.

4. Statistical analysis

Histogram analysis tools are used to commentate the relation among success points and game playing experiences. In this analysis step, total number of gamers and non-gamers are included disregarding their genres. Analysis consequences are obtained as following figures (Figure-9, Figure-10, Table-2 and Table-3):

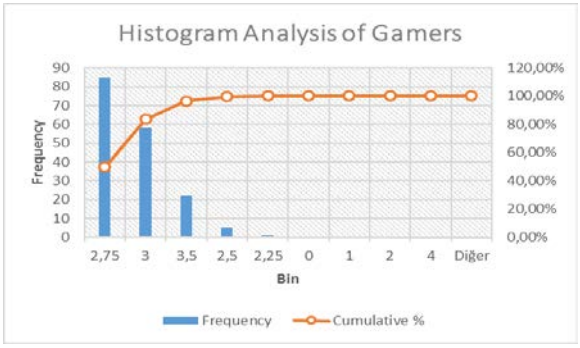

Figure 9. Gamers histogram analysis

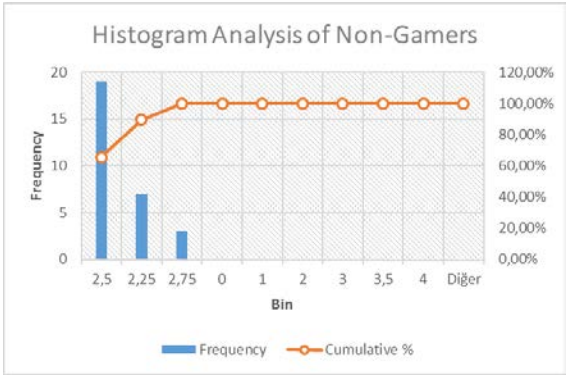

Figure 10. Non-Gamers histogram analysis.

Table 2. Gamers Histogram Analysis Results

Bin	Frequency	Cumulative%	Bin	Frequency	Cumulative%
0	0	0,00%	2,75	85	49,71%
1	0	0,00%	3	58	83,63%
2	0	0,00%	3,5	22	96,49%
2,25	1	0,58%	2,5	5	99,42%
2,5	5	3,51%	2,25	1	100,00%
2,75	85	53,22%	0	0	100,00%
3	58	87,13%	1	0	100,00%
3,5	22	100,00%	2	0	100,00%
4	0	100,00%	4	0	100,00%
Other	0	100,00%	Other	0	100,00%

Table 3. Non-Gamers Histogram Analysis Results

Bin	Frequency	Cumulative%	Bin	Frequency	Cumulative%
0	0	0,00%	2,5	19	65,52%
1	0	0,00%	2,25	7	89,66%
2	0	0,00%	2,75	3	100,00%
2,25	7	24,14%	0	0	100,00%
2,5	19	89,66%	1	0	100,00%
2,75	3	100,00%	2	0	100,00%
3	0	100,00%	3	0	100,00%
3,5	0	100,00%	3,5	0	100,00%
4	0	100,00%	4	0	100,00%
Other	0	100,00%	Other	0	100,00%

5. Results and discussion

200 civil engineering students were contributed the questionnaire, and 13 % of whom are female engineer candidates. As per the figure 7, female participants preferred top three game genres as strategy, sports and art games. For male gamer students, leading game genre is strategy, and sport comes second and the third one is the simulation games (Figure-8). Total results are the same as the male gamers' choices depending on the abundance of male genre as civil engineering candidates.

In line with the histogram analysis outcomes, there is a strong correlation between the student success point and their past game playing experiences. Student brain analysis and action skills could be improved due to their past gaming background and with the aid of these skills, their concentration to engineering lessons could be well enough to get high grades.

Based on the research results, the following topics are suggested to increase learning rate of civil engineering students, and game studios perspective to engineering education:

- Game and simulation based educational systems can be developed and integrated to civil engineering education in order to increase understanding rate and practice of the students.
- Game developers can improve their simulation games by collaborate with civil engineering educators.
- The production number of games comprising decision making and brain storming tools can be increased and in more detail in order to meet engineering requirements of engineering education system.

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