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ÚSTAV JAZYKŮ

EVOLUTION OF VIDEO GAMES AND THEIR IMPACT ON SOCIETY

VÝVOJ VIDEOHER A JEJICH VLIV NA SPOLEČNOST

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Abstract

The aim of this bachelor's thesis is to provide a brief history of video games and to analyse their impact on the society. The thesis describes the evolution of video games from the beginning up to year 2010 and the problems, which video game developers had to face during prosperous and difficult periods as well. It also describes several video game peripherals, mainly focusing on the virtual reality. The analysis of the impact of video games on the society is based on several reliable studies conducted mainly by scholars respected in their own fields.

Key words: video game, player, console, arcade, develop, study

Abstrakt

Cílem této bakalářské práce je poskytnutí struční historie videoher a analyzování jejich vlivů na společnost. Tato práce popisuje vývoj videoher od jejich počátku až po rok 2010 a také problémy, kterým museli vývojáři videoher čelit během příznivých i těžkých období. Také popisuje některé video-herní periferie a zaměřuje se zejména na virtuální realitu. Analýza vlivu videoher na společnost je založena na několika důvěryhodných studiích vedených odborníky, kteří jsou uznávaní ve svých oborech.

Klíčová slova: videohra, hráč, konzola, arkáda, vyvinout, studie

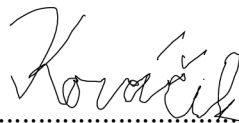
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Prohlášení

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V Brně dne 30.5.2017.....


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(podpis autora)

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Introduction

Video games are slowly but surely becoming a part of the society. What used to be considered a pastime only for the smartest is nowadays considered to be one a hobby of an average teenager. Video games were not developed overnight. The differences between the first video games and the latest video games are enormous. Not only the video game graphics have been improved, but the controllers and other aspects of video games as well. Additionally, as video games are present in the society for quite some time, it is inevitable for them to have some sort of impact on the people and different parts of the society.

This bachelor thesis describes the evolution of video games and the impact of video games on society. The first part of the thesis provides a very brief introduction to the topic of video games, followed by a detailed and relatively brief summary of the video history since the beginning up to the year 2010. It covers topics such as the first video game, struggles of individual video game developers, co-operation between American and Japanese companies of the video game industry, development of new video game platforms and an overall description of several key, interesting or unique video games.

The second part talks about video game peripherals. These are the additional PC or console devices that are used for certain video games in order to enhance the gameplay. In this part, several of the more unique, interesting and mainly functional video game peripherals will be described. The main focus is going to be on the virtual reality and its manifestation in the video game community.

The last part of this thesis deals with the impact of video games on the society. This part will look more closely at what video games changed or whether they brought something new to such fields of education or medicine. It also tries to clarify the link between aggression and use of violent video games.

1 Introduction to video games

In order to talk about video games, it is important to define what a video game is. A brief definition in the Cambridge Dictionary states that a video game is “a game in which the player controls moving pictures on a screen by pressing buttons” (Video Games, 2016). The main purpose of video games is to provide entertainment to those, who are playing them.

Video games are quite a recent innovation, dating back only to the 1950s. Nevertheless, it would be hard to argue that the most recent games are only a step away from perfection. As the time passed by, the popularity of video games has severely increased and the development process has improved multiple times. The reason for these improvements were different technological breakthroughs over the course of the years that allowed game developers to create better and more realistic games.

As the years passed, more and more genres of video games have appeared. Nowadays, it would be difficult to count all the genres, but there are a few of them that are more popular than others. One of the most popular games are *role playing games*, or RPGs in an abbreviated form, where one can take control of a character, who is ready to explore the artificially created world that has got a certain limit to the exploration. There are many other types of genres like *adventure games*, which are one of the earliest games that were ever created, *strategy games*, where one has to depend solely on his tactical abilities to achieve the goal of the game, *shooter games*, where one has to kill his/her enemies in order to progress and many others. However, in most cases it is not the genre that defines a video game, but it is the video game that defines a genre. Some video games are almost like a definition of a certain genre. For example, *World of Warcraft* defines MMORPGs (Massively Multiplayer Online Role-Playing-Game), *Doom* defines shooter games, and *Sid Meier's Civilization* defines strategy games. This, however, does not apply to all games. There are numerous games that cannot be described by just one genre. Most of the games are a mix of at least two video game genres. This may lead to a surprisingly good and original video game. Nowadays, it has to be quite a difficult task to create an original video game that would attract a decent amount of players.

One might say that it was easier to create new games in the past, which is true to some extent, but not all video games that were created became popular. There were games that were better and there were games that were surpassed by the better games. Whether it was because they had a superior game design, more appealing game features, or better advertisements, certain games left a bigger mark in the history than others. Thus, these are the games, about which one could say that formed the history of video games.

2 The history of video games

The history of video games is relatively short, but that does not mean it was uneventful. Before video games, there was something that most possibly served as a foundation of all video games. This foundation was several of the oldest coin-operated entertainment units, to which people referred to as novelty games (Kent, 2001).

These are the type of games that can be still found nowadays, but they are not as popular as they were between the 1930s and 1970s. Pinball games, shooting arcades, simulations of sport games (hockey, soccer, baseball, etc.) and many others could be considered as forefathers of video games. People used to spend a ridiculous amount of money and also a lot of their time playing these games.

Some might claim that modern video games have very little in common with them, but as Steven Baxter, former producer of *The CNN Computer Connection*, said: “You can't say that video games grew out of pinball, but you can assume that video games wouldn't have happened without it” (Kent, 2001, p. 17). Novelty games had indisputably served as templates for video games, and almost 25 years later, after the first appearance of novelty games, the first video game saw the light of the day.

2.1 The first video game

The historical data contained in this chapter comes from the source cited in the references as '*The First Video Game?*' by the Brookhaven National Laboratory, unless it is stated otherwise.

The first video game ever created was *Tennis for Two*. The concept of this game was simple, two players playing virtual tennis. It was created by the physicist William Higinbotham in 1958. One could say that *Tennis for Two* does not deserve the title of ‘the first video game’, because there were three other candidates that came before *Tennis for Two*.

In 1948 it was the ‘Cathode-Ray Tube Amusement Device’ (patented by Thomas T. Goldsmith Jr. and Estle R. Mann), which required players to overlay pictures or illustrations of targets in front of the screen. Even though it was designed for enjoyment of people, it is quite hard to consider this as a video game, since it did not display entire game visuals on the screen.

In 1951 came the Nimrod Computer, which was built to display an old game of logic and strategy named *Nim*. Built by Ferranti International, this electronic version of the game was designed to serve as a proof of the processing power of the computer, not as a form of entertainment. Thus, it is hard to label it a video game.

A year later, in 1952, an electronic version of *Tic-Tac-Toe* was created. This was another game designed for academic purposes and not for entertainment. Created by A.S. Douglas at the University of Cambridge, this was another game that should not receive the title ‘the first video game’.

When all of these games are compared with *Tennis for Two*, it can be clearly seen that *Tennis for Two* was the first attempt to create an entertaining game that displays entire game visuals on the screen. Some might still argue that not even *Tennis for Two* deserves the mentioned title, because it is not a proper video game. The reason for that would be the definition of the term *video*. “The term *video* implies that electronic signals are converted to images on a screen using a raster pattern, a series of horizontal lines composed of individual pixels” (The First Video Game?, 2016).

It is true that *Tennis for Two* did not create a video signal, however, the way in which Higinbotham managed to create the illusion of a tennis court and a ball bouncing back and forth according to players’ commands was so amazing, it made people feel like they were playing a proper video game.

2.2 The beginning of video games

The historical data contained in this chapter comes from the source cited in the references as ‘*The Ultimate History of Video Games*’ by Steven L. Kent, unless it is stated otherwise.

Even though *Tennis for Two* was created in 1958 and it could be considered as the start of video games, it is generally agreed that the early 1970s are considered as the beginning of video games. The reason for this is the boom in the video game industry that happened during that time. Not only people could buy Odyssey, which Tyson (2016) describes as “the first home video game system”, but people could also play Atari’s *Pong*, which was described by Tyson (2016) as “the first truly successful commercial arcade video game.” Both *Pong* and Odyssey were released in 1972. The older generation may remember them, or they might have owned such a console or played *Pong* when it was released.

A year prior to them, Nolan Bushnell, co-founder of Atari Inc., created a video game named *Computer Space*. Its concept was based on a video game that had been created and released almost a decade prior to the release of *Computer Space* named *Spacewar!*. *Spacewar!*, created by MIT student Steve Russel in 1961 and finalized in 1962, was a two-player game that took place in space. Both players controlled a rocket that could rotate clockwise or counter-clockwise, thrust forward, and shoot missiles. The aim of the game was simple. Players had to destroy the opponent’s rocket. The graphics of such a game were not superb, but the game had a sun with an accurate gravitational field in the middle of the fighting field. Thus, players had to be aware of their opponent and they had to be careful not to be dragged into the sun. Each player also had a hyperspace button, which teleported the player to a random location. This could either save players from imminent death or it could kill them immediately by teleporting them into the sun. It was quite popular among MIT students, but overall, it was not very successful because it ran only on very pricey computers.

Bushnell’s *Computer Space* was not a big hit, albeit it was popular among Stanford students. With the game’s several pages long manual, it was too complicated for most of the common people. It never became as popular as Bushnell wanted to and its unpopularity resulted in financial problems for Nutting Associates, a company where

Bushnell was working at that time. Bushnell, aware of his mistakes, left the Nutting Associates and co-founded the nowadays worldwide known Atari, an American company that focused on the development of video games and home computers, which led to the creation of the first successful video game *Pong*, mentioned above.

Pong, created by an employee of Atari Al Alcorn, was far more successful and more popular than Bushnell's *Computer Space*. Bushnell had not expected *Pong* to be such a success. In fact, he gave Alcorn a task to make a video game based on table tennis. This task was supposed to be an exercise for Alcorn. Bushnell's original intentions for Alcorn were to get him used to the game making process and once he was done with the ping-pong based game, Bushnell wanted to discard the game. However, Alcorn did not know this at that time, thus, he did everything he could to make the game as best as possible. The goal of the game was simple. Beat your opponent in a game of *Pong* by scoring more points than your opponent. Bushnell wanted Alcorn to make a very simple game, but Alcorn did something extra that made *Pong* entertaining. He made the paddles very proficiently. The direction of the ball bouncing off the paddle depended on the part of the paddle that would hit the ball. Also, he included a feature of ball acceleration. This meant that the ball would speed up after several hits.

After he presented the game to Bushnell and Ted Dabney, co-founder of Atari, they were very surprised and pleased with the end result. Alcorn exceeded Bushnell's expectations by being able to create such a simple and entertaining game. Afterwards, Bushnell added some improvements to it and they decided to try the prototype out. The *Pong* prototype was very successful. Neither Bushnell or Alcorn expected that. Needless to say, Bushnell did not hesitate to start manufacturing *Pong* as quickly as it was possible. Thus, *Pong* became an iconic game for Atari.

2.3 What came after *Pong*?

The historical data contained in this chapter comes from the source cited in the references as ‘*The Ultimate History of Video Games*’ by Steven L. Kent, unless it is stated otherwise.

Pong was a real success and it was no surprise that many different companies made different counterfeits of it. Bushnell tried to patent the game, but he was too slow, and when the patent came out, it was useless. This, however, did not deter Atari from making more games. At first, many of these new games were based on *Pong*. The rivalling companies were making games based on *Pong* as well. None of these games were as popular as *Pong*. However, later in 1974, Atari attempted to create something that had not been created before, the first racing game, which was named *Gran Trak10*. Even though its graphics were similar to *Pong*, it started a flow of new ideas. There were numerous original games that Atari made. *Space Race*, where players had to dodge asteroids while flying a spaceship, *Steeple Chase*, where players had to jump obstacles while riding a horse, *Stunt Cycle*, where players had to jump buses while riding a motorcycle, and etc. However, Atari was not the only company that started to look for new ideas.

Midway was one of the companies that was able to compete with Atari. Their first important video game was *Gunfight*, released in 1975. While the concept was not original (it was originally developed by a Japanese company, but licensed to Midway for the U.S. market), Midway redesigned the game and introduced a new technology along with it. The designer, David Nutting, that was asked to redesign *Gunfight* has not only improved its graphics, but he also placed objects between the two gunslingers. This was a huge change and “to power these changes, Nutting incorporated a microprocessor into the game’s design, making *Gunfight* the first video game with a microprocessor” (Kent, 2001, p. 64).

The trend of popular games not based on *Pong* did not last. In April 1976, Atari made *Breakout*, which was a very popular game based on *Pong*. *Breakout* was basically a single-player *Pong* rotated by 90 degrees, and the goal was to strike bricks out of the wall. Bushnell made this concept all by himself and he knew that people were going to love it. The problem was the manufacture cost. The best way to reduce the cost was to

reduce the amount of chips that was on the circuit board, because each chip that was removed before the production would save approx.. \$100,000 in the long run. Bushnell offered extra money to engineers for each removed chip and the only one that accepted the offer was Steve Jobs, who was working at Atari at that time. Jobs however, did nothing to improve the circuits of *Breakout*. Instead, he asked his friend, Steve (Woz) Wozniak, for help. Wozniak was able to remove approx. 50 integrated circuits, which was beyond expectations, but he was also the only person that knew how to make it, thus, the game could not be manufactured. In the end, the final design had about 100 integrated circuits, whereas the Wozniak version had about 30 integrated circuits.

Later, in August 1976, Fairchild Camera and Instrument released a new type of game console named Fairchild Channel F, which was the first game console where players could enjoy games that were stored on cartridges. Players were able to change these cartridges in order to play a different game. Each cartridge had a microchip that contained the game, which was programmed on it. It was not the first console that allowed players to play multiple games on one console, but up to this point, most companies were selling consoles, which contained only one game, e.g. Atari's home version of *Pong*. This change revolutionized the video game industry. Even though Fairchild Channel F was not hugely popular, it made people realize that they do not want just one game per console. This led different companies to create different entertainment systems. One that was different than the other entertainment systems was Atari's Video Computer System (VCS), later known as the Atari 2600.

The VCS utilized the microprocessor 6507, which made the production cheaper and it also processed information faster. It was sold with 9 game cartridges and a joystick, which was introduced in the video game industry for the first time. The VCS was released in September 1977 but it did not do too well on the market, mainly due to shipping problems. This, however, changed the following year. The main reason of the VCS success on the market was the introduction of new game cartridges.

One of them was *Space Invaders*. Introduced as a VCS game cartridge in 1980, it was originally distributed in 1978 in Japan by Taito, a Japanese video game developer and publisher. *Space Invaders* was a game based on an alien invasion. Players had a task to defend the Earth by defeating waves of aliens trying to invade the Earth. To do so,

players had to shoot lasers from a laser turret and they had to dodge the incoming shots fired by the aliens. The aliens descended towards the Earth in a rectangular formation and they were moving from one side to another. If players lost all their lives, or if the aliens managed to land on the Earth, players lost the game. *Space Invaders* were so popular in Japan that Taito decided to introduce it to the American market. The American audiences loved it and *Space Invaders* became a hit, which raised the interest in video games even more. This led to a beginning of a new era for video games.

2.4 The golden age of video games

The historical data contained in this chapter comes from the source cited in the references as '*The Ultimate History of Video Games*' by Steven L. Kent, unless it is stated otherwise.

The golden age of video games refers mainly to the arcade games of the very late 1970s up to the mid-1980s. Up to this point, video games and mainly arcade games were quite popular, but their popularity increased exponentially during this period. The reason for this is quite possibly the variety of video games that were released on the video game market. Video game developers got more creative and the games looked good as well, which was a result of several technological advancements.

One of the advancements was vector graphics technology introduced by Larry Rosenthal, an MIT graduate, who joined Cinematronics, an arcade game developer. The shift from raster-scan technology to vector graphics technology resulted in better images of independent objects that were moving on the screen. The vector graphics also allowed to have more independently moving objects on the screen at the same time. Cinematronics used Rosenthal's technology to create an improved version of *Spacewar!*. The game was named *Space Wars* and it was the first game that used the vector graphics. It was released in 1978 and it was one of the few companies that managed to release a successful game during the *Space Invaders* craze.

Later, in 1979, one of the Atari's engineers, Howie Delman, made a powerful vector graphics generator, which was used in several Atari's games. One of the popular games that utilized this generator was *Asteroids*, in which players controlled a spaceship and the task was to destroy asteroids. The controls were similar to *Spacewar!*. Players

had to navigate the spaceship in order to avoid the incoming asteroids while they had to shoot them in order to clear the area. Each time players shot an asteroid, it would get smaller, until it finally disappeared. Once the area was clear, a new area with new asteroids would emerge. The game also had two types of UFOs. One of them was big, slow and it fired shots in random directions. The other type was small, fast and it fired shots aimed at players. Also, the game rewarded players at regular intervals with extra lives. The world endurance record in *Asteroids* is 36 hours.

A year later, in 1980, *Pac-man*, one of the most popular and iconic games, was released. *Pac-man* was made by Toru Iwatani, a former video game developer, who was working for Namco, a Japanese corporation that focuses on the development and publishing of video games. Iwatani made different variations of pinball games up to April 1979 when he decided to make a game that could attract the female audience as well. He chose to build the entire game concept about eating. Once he had his concept, he made a character for the game. Iwatani himself said: “The actual figure of *Pac-Man* came about as I was having pizza for lunch. I took one wedge and there it was, the figure of *Pac-Man*” (Kent, 2001, p.157). The next thing Iwatani and his team created were *Pac-Man*’s enemies. They created colourful and adorable ghost with big eyes in order to appeal to the female audience. The last step consisted of creating the virtual playground and all the food that *Pac-man* was supposed to eat. In the final version of the game, which was released in June 1980, there were 240 dots in a maze, which *Pac-man* had to eat, in order to beat the level. Players had to avoid the ghosts as well. Due to its simplicity and fun gameplay, *Pac-man* became a worldwide hit and it is one of the most known games. As the founder of Namco, Masaya Nakamura, once said: “I did not imagine that *Pac-Man* would be an international hit of the magnitude that it was and is to date. People know *Pac-Man*. People who don't even know about video games know about *Pac-Man*” (Kent, 2001, p. 158). With *Pac-Man*, the popularity of the arcade games grew even stronger and people could find video games literally everywhere in America. People spend many hours and even more money playing video games. This attracted many Japanese companies to the American market. There were only few Japanese companies that were profiting through American companies, but some Japanese companies seemed unable to get into the American market. Nintendo was one of them.

Nintendo was a very old company that switched to making toys and electronic games before 1980. The president of Nintendo Company Limited, Hiroshi Yamauchi, decided to establish an office in the United States, in order to successfully get into the American market. Even with the established office, they were not able to break into the market until 1981, when Shigeru Miyamoto, who was a young college graduate at that time, but nowadays is known as the creator of some of the most successful video games of all time, created *Donkey Kong*. At first, Miyamoto forged a story for *Donkey Kong*, which was about a gorilla that fled from his master, a carpenter, and kidnapped the carpenter's girlfriend. The gorilla then climbs up to the top of a construction site and the master has to ascend to the top, while he had to dodge the incoming barrels and fireballs, in order to rescue his girlfriend. The master was named Jump-man at first, but he became later known as Mario, who later became an icon for the Nintendo. *Donkey Kong* was a huge success and Nintendo managed to establish itself on the American market.

The video game market was very promising, until the mid-1982. Afterwards, the market experienced a sudden change. As Kent (2001, p.192) describes it in his book: "The industry didn't crash; it simply stopped growing." This meant an enormous loss of money for several entrepreneurs, who invested in the video game market. Some decided to build big places filled with arcades, which had to be closed due to the lack of interest from the audience. Some had placed games into various shops, hotels, restaurants, and etc. This resulted in a lot of debts from many of them. To sum it up, arcade games were no longer interesting for the audience, no one knew why it happened so suddenly and companies started to back away from the video game market in America.

2.5 Nintendo saves the day

The historical data contained in this chapter comes from the source cited in the references as '*The Ultimate History of Video Games*' by Steven L. Kent, unless it is stated otherwise.

The leap from arcades to game consoles was not as swift as it may sound. In August 1982, Commodore International, which was a North American company that manufactured home computers and electronics, released the Commodore 64. It was a very successful home computer, and the founder of the company, Jack Tramiel, did not discourage others to create video games for the Commodore 64 as opposed to the Atari's

strategy. This spawned quite a lot of game companies that focused on creating computer video games. One such company was Electronic Arts, which is still active even nowadays. This company was founded by Trip Hawkins, a former Apple Computer employee. Hawkins was also the man who managed to revolutionize the way of packaging video games. Prior to that, video games were sold in plastic bags. Hawkins wanted to not only have a good game, but a great package as well. He used to call these packages ‘album covers’. As Kent (2001, p. 279) describes it as follows: “Album covers were custom-made boxes with professional art and the designers’ names placed prominently on the label.”

Electronic Arts produced quite a lot of computer games for the Commodore 64 in 1983 and games like *Hard Hat Mack* even became bestsellers. Nevertheless, the year 1983 is still considered as the year when the video game market in America crashed. Many video game companies were basically forced to retreat because the public was no longer interested in video games. This includes Atari as well. It seemed like the revival of the video game market in America was next to the impossible. One company, however, proved it wrong.

In 1985, Nintendo managed to save the American video game market by introducing the Nintendo Entertainment System (NES). The NES was first introduced by Nintendo in the Japanese market in 1983, where it was labelled as Famicon (an abbreviation from ‘family computer’). The concept of the NES was similar to the Atari’s. The main difference between the Atari’s VCS and Nintendo’s NES was that the NES was composed of components that were not available in the 1976, when the VCS was developed. The NES had a processing chip 6502, which was very similar to the processing chip 6507, which was in the VCS, but the 6502 was more powerful than 6507. The NES also had an extra processor that generated graphics and it also had an additional memory. Because of this, the NES was the superior game console when compared with the VCS. The NES generated more colours and its graphics were the best on the market. It also introduced a new type of controller that was much more comfortable to hold than the Joystick. Players were able to control in-game characters by pressing the plus-shaped directional pad with their left thumb and by pressing the A and B button with their right thumb. Many players thought that this controller was far easier to use than the joystick.

With its superior hardware and easy to use controller, the NES was the best game console on the market and Nintendo had no trouble to sell it in Japan.

In America, however, the video game market had experienced a huge crash and Minoru Arakawa, former president of Nintendo of America, and Howard Lincoln, former chairman of Nintendo of America, struggled to sell the NES there. At first, they tried to establish a partnership with Atari in the 1983 in order to sell the Famicon (they renamed it to NES later in 1985). Lincoln and Arakawa almost managed to persuade Atari to sign a deal with them, but it never happened. Later in 1985, the president of Nintendo Company Ltd., Hiroshi Yamauchi, decided that they will try to get to the American market one more time. The reason for this decision was the success of the Famicon in Japan. After two unsuccessful attempts to sell the Famicon at the Consumers Electronics Show (ECS), Arakawa had renamed the Famicon to the NES and decided to launch the NES in New York with a group of seasoned employees. They had to do a lot of bargaining with the shop owners but eventually they succeeded.

Up to this point, the most popular games for the NES were most probably *Duck Hunt*, *Hogan's Alley*, and *Donkey Kong*. They were not bad, but they were not anything spectacular either. When Nintendo released *Super Mario Bros.*, however, it became an instant hit. The in-game character Mario had appeared in several previous Nintendo games, e.g. in *Donkey Kong* where he was chasing the gorilla that kidnapped his girlfriend. *Super Mario Bros.* offered a huge and colourful world full of obstacles, which Mario had to overcome, in order to save the princess from a dragon (whose name was Bowser). The world was too huge to fit on the screen, thus, the camera was following Mario as he was trying to avoid different types of enemies and climb over obstacles. This type of game is called a side-scrolling game and it means that players cannot go back to a specific part of a level, once they passed it, as the camera would only move forward. Players could collect items not only for points, but for power-ups as well. Certain item would allow Mario to shoot fireballs, become temporarily invulnerable, gain extra lives, and etc. *Super Mario Bros.* also introduced Mario's brother Luigi as a playable character, who was basically a green version of Mario. The game was one of the most successful games in Japan since its release by the end of 1985, thus, Nintendo also made an American version of the game in 1986.

There were also other companies with different game consoles that tried to compete with the NES, but Nintendo had relationships with strong partners that either created great games for the NES, or they helped Nintendo to advertise the NES.

2.6 Introduction of the save option

The historical data contained in this chapter comes from the source cited in the references as '*The Ultimate History of Video Games*' by Steven L. Kent, unless it is stated otherwise.

In 1986 in Japan, Nintendo presented the first game that allowed players to save their progress. This game was called *The Legend of Zelda*, which was released in 1987 in America. Prior to this game, players had to finish a game in one go. *The Legend of Zelda* changed this trend, and it allowed players to save their progress, before shutting down the console. The game itself was a role-playing-game where people play as Link, a young elf, who has to defeat an evil creature Ganon in order to rescue the princess of Hyrule, Zelda. The game was played from a top-down view. It was the biggest game so far and it was very complex. There were numerous dungeons, treasures, different creatures, main and side quests, and etc. The game was so complex that it was packaged with a little but thick instruction book that covered most of the in-game weapons, creatures, and mechanics. It also contained a map of the Hyrule. This made it easier for the players to navigate through the land of Hyrule. People could also call the '*The Legend of Zelda* customer service' whenever they were not sure about something in the game. This telephone number was set up by Minoru Arakawa just as a precaution with 4 to 5 people ready to answer possible phone calls. In the end they had 200 people answering the calls of people that needed help with the game.

2.7 First appearance of cheats in video games

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Nowadays it is no surprise that each game has many different cheat codes, which can be used by players. However, this was not always the case. In 1988, Konami, which was a partner company of Nintendo at that time, developed a side-scrolling shooting game called *Contra*. It was one of the first games that had a built-in cheat code. People refer to the cheat code as the Konami code. The reason for this is because Konami used the cheat code in several of its games. It first appeared in 1985 in a game called *Gradius*. *Gradius* was a side-scrolling shooting game that took place in space. After the cheat code was executed, players could equip his/her spaceship with a huge arsenal of weapons. This made the game easier than it was designed to be. In order to execute the code, players had to press a precise series of buttons before s/he started the game. As Kent (2001, p. 374) describes it in his book: “...players had to press hit the directional pad on their controllers up twice, down twice, left, right, left, right, ‘A’, ‘B’, and then ‘Start’ buttons.” The Konami code did different things in different games. For example, if players executed the code in *Contra*, they would receive 30 lives instead of 3. The Konami code is considered to be the first cheat code in the video game history.

2.8 Battle between Sega and Nintendo

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Nintendo was not the only company that had a game console on the market. Up to 1989, Nintendo held most of the video game market, mainly because of the NES and a variety of games available for the console. However, in August 1989, Sega, which is a Japanese company that focuses on developing and publishing video games, released their new game console called the Genesis in America. The main difference between the Genesis and the NES was that the Genesis had a 16-bit processing chip, which allowed to process more data than the 8-bit chip in the NES. The Genesis also displayed 12 more colours than the NES. The game that was shipped with the Genesis, *Altered Beast*, fully

demonstrated the capabilities of the Genesis. This changed the market over the course of a few years and Sega held almost half of the video game market in America, albeit, Nintendo was still in the lead. The reason for that was probably the fact that the NES had much larger video game library than the Genesis. In addition to that, Nintendo also released a new handheld game system called the Game Boy in 1989, which was shipped with the popular game *Tetris*. The Game Boy was a hit and it sold extremely well. The year 1990 was, according to Peter Main, a former executive vice president of Nintendo of America: “The best year for the NES, the most lucrative year for the NES, was 1990, which was also the first full year that Sega Genesis was on the market” (Kent, 2001, p. 436).

However, in 1991, things started to look better and brighter for Sega. It was the year when the game *Sonic The Hedgehog* was released in America. *Sonic The Hedgehog* is the creation of Yuji Naka, who was a young game designer at the time. Naka wanted to create a mascot for Sega and he managed to do so. The mascot came in the form of an extremely fast blue hedgehog that wears red sneakers and has the same name as the game. *Sonic The Hedgehog* was an instant success and the game replaced *Altered Beast* as the product that was shipped with the Genesis.

Despite the fact that in 1991 Nintendo of America released a new game console called the Super Nintendo Entertainment System (SNES), and another Mario related game called *Super Mario World* that was highly anticipated, Sega still outsold Nintendo in the Genesis vs SNES battle at the end of the year 1991. This continued in 1992 as well, but it started to look like Nintendo might get in the lead quite soon.

2.9 Violence in video games

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The year 1993 brought two major violent video games, *Mortal Kombat* and *Doom*. Both games are different from each other in terms of gameplay, but similar in terms of violence.

Even though *Mortal Kombat* originally came out in 1992 as an arcade game, the home version of the game was released in 1993. *Mortal Kombat* is a fighting game where two combatants have to fight to death. What made *Mortal Kombat* different from other fighting was the excessive violence. It displayed blood, intestines, bones, and etc. Each character could finish off the beaten opponent with secret finishing moves that were called 'fatalities'. A fatality of one combatant was ripping the spine off of the beaten opponent.

Doom was a first-person shooting game and it basically established the formula for numerous games, which were released years later after *Doom*. Created by id Software, a small company that created *Wolfenstein 3D* a year prior to *Doom*, *Doom* gave players the impression of killing opponents from their point of view. Players basically had to shoot their way through the levels in order to progress. The difference from previous shooting games was that enemies that were killed in *Doom* did not disappear. Instead, they were lying on the floor and bleeding, motionless. In addition to it, the maps of *Doom* contained satanic symbols and demons.

Both games were a major success and both games started major debates over the violence in video games. One outcome of these debates was the creation of a rating system for video games.

2.10 Sony joins the console race

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The two major companies that were competing with each other in terms of game consoles, video games and overall sale were Nintendo and Sega. There were other companies as well, but they were not very successful. In 1994, both Nintendo and Sega tried to prove that they are one of the leading companies indeed. Nintendo published *Donkey Kong Country*, which became their best-selling video game after *Super Mario Bros.* *Donkey Kong Country* was created by Rare Ltd. and it was one of the most realistic looking game so far, despite it was created for the 16-bit SNES, which was considered to be obsolete at that time.

In order to compete with Nintendo, Sega released a new 32-bit system called the Saturn. It was first released in Japan in November 1994 and a year later in America. The console sold pretty well, but it was not the hardware that sold it. The reason why people bought the Saturn was the game *Virtua Fighter* that was packaged with the console. *Virtua Fighter*, originally came out in 1993 as an arcade and it was developed by: “Sega's most famous internal development team-AM2, led by Yu Suzuki” (Kent, 2001, p. 515). *Virtua Fighter* was the first fighting game that introduced 3D fighters. Each one of them had a unique fighting style, and it served as a template for several fighting games whose design was based on the *Virtua Fighter*'s concept.

Both Nintendo and Sega were trying to prove that they were the best companies in the video game industry. None of them, however, could anticipate that Sony would join the video game industry with its new video game console called the PlayStation in December 1994 in Japan. The PlayStation was a 32-bit System that was labelled as the next-generation console. Unlike the Saturn, however, the PlayStation was easy to program and this attracted numerous game designers. Despite the fact that the Saturn was more popular than the PlayStation during the initial release, the PlayStation outsold the Saturn over the course of the following years.

2.11 Electronic Entertainment Expo – E3

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Prior to E3, video game companies had to attend the Consumers Electronics Show (CES), in order to demonstrate their new products. This changed in 1995 when “a large international publishing company called IDG Communications approached the IDSA with a proposal for an annual show called the Electronic Entertainment Expo (E3)” (Kent, 2001, p. 517). IDSA, Interactive Digital Software Association, is a trade organization for the video game industry. It was formed in 1994 and renamed to Entertainment Software Association on July 2003 (Entertainment Software Association). Since the creation of E3, video game companies attend it annually to show their latest products, however, Nintendo and Microsoft did not initially attend E3. In 1995’s E3, the two main events were Sony’s introduction of the PlayStation to the American market, and Sega’s introduction of the Saturn.

During the same year, Nintendo unveiled its new 64-bit video game console called the Nintendo 64 (N64) and a new handheld device called the Virtual Boy. The Virtual Boy was an attempt to create an illusion of 3D images in a hand-held gaming device, however, its design caused headaches and dizziness. Obviously, people were not interested in it. On the other hand, the N64, which was a 64-bit game console, was a huge success. It was released a year later, in 1996. Also in 1995, Microsoft released their new operating system, Windows 95. Windows 95 allowed smooth run of video games and it made a large impact on the video game industry over the following years.

2.12 The Tasmanian devil and the plumber boy

In 1996, Sony released *Crash Bandicoot* for the PlayStation. *Crash Bandicoot* was developed by Naughty Dog (Donovan, 2010). The game itself has an awesome gameplay and it follows a human-like bandicoot named Crash, whose task is to stop the evil plans of Doctor Neo Cortex, who created Crash from an ordinary bandicoot in one of his experiments. Along his way, Crash has to defeat multiple enemies that count as bosses in order to get to Cortex. *Crash Bandicoot* is a platform-based game where players have to avoid obstacles, jump over chasms, collect apples, ride on wild hogs, and etc. until they reach the lair of Doctor Cortex. *Crash Bandicoot* was quite a popular game.

During the same year, Nintendo released another sequel revolving around the Mario universe. The game was released for the N64 and it was named *Super Mario 64*. In *Super Mario 64*, development team under the lead of Shigeru Miyamoto took the two-dimensional world of Mario universe and introduced it to the third dimension (Kent, 2001). The game was well received by the audience and it was one of the most popular games for the N64. Both Crash and Mario had multiple sequels in the following years and both franchises spawned racing games, where players could choose from a variety of characters.

2.13 Modding in video games

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Many players wanted to create their own modifications of their favourite games, which was quite difficult and demanding. In 1996, however, an easier way was presented by the id Software. With the release of a first-person shooting game called *Quake*, they also released a programming language QuakeC, which according to Tristan Donovan (2010, p. 324) “allowed players to not only create new maps for players to fight in but offered enough flexibility for them to build whole new games on the back of the *Quake* engine.” id Software did encourage players to create their own content for their previous games *Doom* and *Wolfenstein 3D*, but this was the first time they actually gave players

the very tools they needed for modification (modding) of a game. This spawned numerous creations and the most popular one was created by a team of three people that managed to create a modification of the game (mod), which was considered as a game of its own. Its name was *Team Fortress*, which was later recreated by Valve, an American video game developer, publisher and distributor, into a successful game in 1999.

In a similar fashion, *Half-Life*, a revolutionary first-person shooting game created by Valve in 1998, spawned numerous mods as well. In *Half-Life* players assume the role of Gordon Freeman, who is a scientist that is being transported into a seemingly secret and very secure research lab. The first few minutes of the game seem dull and unnecessary at first, but once players progress, they realize that the developers of *Half-Life* chose to tell the story of the game mainly through the means of visuals, instead of linguistic means. When the experiment, which was partially performed by Gordon Freeman, goes wrong, no words are necessary to describe the situation. The most iconic visual representation of the game's story is probably when the army comes into the research laboratories. Assuming that they came to the players' rescue, the horrifying truth that they came to finish off the survivors is earth-shattering. The game was extremely successful. Additionally, in 1999, *Counter-Strike* was created as a mod for *Half-Life*. *Counter-Strike* is one of the most known games in the world of video game industry to this day.

2.14 Pocket monsters

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The phenomenon of *Pokémon*, which is an abbreviated form of pocket monsters, came to America in 1998. It was originally released in 1996 by Nintendo in Japan. *Pokémon* was designed as a cartridge for the Game Boy. *Pokémon* was created by Game Freak Inc. and Shigeru Miyamoto "oversaw the project from Nintendo's side as it evolved into a full-fledged RPG for children, a universe in which children captured and trained friendly monsters, then entered them to fight in competitions" (Kent, 2001, p. 580). Nintendo created two versions of *Pokémon*, *Pokémon Red* and *Pokémon Green*. The difference between them was that each version had a small number of *Pokémon* that were

unique to the specific version. If any player wanted to catch all the 151 *Pokémon*, s/he would have to trade with other players who played the other version of *Pokémon*.

Initially, Nintendo did not think that *Pokémon* would appeal to many people, but what started as a video game eventually turned into an industry of its own. The *Pokémon* cartoon, trading cards, toys, clothes, and etc. *Pokémon* was simply the most popular thing in Japan. Once Nintendo released *Pokémon* in America, people were excited about it. Unlike in Japan, everything was released within a short period of time. The game, the cartoon, the trading cards, etc. It was a huge boom and an instant success. In the years following this boom in America, *Pokémon* spawned multiple sequels with multiple expansions of the total number of *Pokémon*.

2.15 Sega gets pushed out of the console race

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Sega was falling behind Sony and Nintendo at this point, so in November 1998, Sega released a new console named the Dreamcast in Japan. It was a new 128-bit game console, that was supposed to put other game consoles to shame. Sega also prepared several games for the Dreamcast’s release. However, some games were not ready until the American launch of the Dreamcast in 1999. One of these games was a fighting game created by Namco called *Soul Calibur*, where the combatants had different fighting styles and weapons. *Soul Calibur* was a home version of the popular arcade game of the same name. Surprisingly, it looked even better than the arcade version. It looked like Sega might get back on even ground with Sony or Nintendo.

This changed, however, in March 1999 when Sony announced that a new PlayStation was under development. Once the performance specifications were revealed by Ken Kutaragi, the creator of the PlayStation, it was clear that the next PlayStation would be superior to the Dreamcast. As Kent (2001, p. 574) describes it: “Sega’s Dreamcast rendered 3 million polygons per second... This sounded impressive until Kutaragi revealed that his next-generation machine could render 60 million raw polygons per second.” It was not just the graphics that were supposed to be superior to the

Dreamcast, but the overall performance as well. In addition to it, the new console was confirmed to be compatible with the previous PlayStation. This meant that players could play all the video games, which are compatible with the original PlayStation, on the new console as well. In addition to Sony, Nintendo announced a new next-generation console during the same year. Unlike Sony, Nintendo refused to say all the parameters of their next-generation console. They did say, however, that its “graphics performance would meet or exceed anything on the market or going into production” (Kent, 2001, p. 576).

At the beginning of the new millennium on March 2000, Microsoft announced that it would make a game console of its own. During this announcement, Bill Gates “unveiled a list of nearly final specifications that were guaranteed to dazzle a technically literate crowd” (Kent, 2001, p. 590). This put Sega into an even worse position than before and during the same month, Sony finally launched their new game console called the PlayStation 2 in Japan. It did not have too many new video games at that time. Nevertheless, it sold extremely well, because of the backward compatibility. Video games for the PlayStation 2 were released later on and many of them were prepared when the game console was released in October 2000 in America. *NASCAR*, *NHL 2001* and many others, including a fighting game *Tekken Tag Tournament* from the popular *Tekken* series.

The launch of the PlayStation 2 slimmed the chances of the Dreamcast’s success even more. Despite numerous efforts, Sega did not manage to sell as many consoles as they originally intended. This led to the discontinuation of the Dreamcast, which was announced by Sega in January 2001 during a press release. A total reorganization of Sega was announced by Charles Bellfield, who was a former vice president of Sega of America, during the press release as well. “And effective as of April 1, 2001, we will have completed a management reorganization and a restructuring of Sega as a company to purely be focusing on a multiplatform strategy as a third-party publisher to multiple platforms” (Kent, 2001, p. 602-3).

2.16 A truly open world

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Only a few months after Sega's Dreamcast manufacture was terminated, two new game consoles that were able to compete with the PlayStation 2 were released. Microsoft revealed their game console called the Xbox on March 2001 and they released it almost half a year later in November 2001 in America (Marshall, 2013). The Xbox was the first game console that was developed in America. Nintendo released its game console called the GameCube in September 2001 in Japan (Nintendo GameCube). New and powerful game consoles were not the only major thing that was released in 2001.

Grand Theft Auto III (GTA 3) saw the light of day in 2001 and it reshaped players' perception of freedom in video games. In each and every video game, exploration is limited to some extent. What was unique and so appealing about *GTA 3*, however, was that these limits were almost unnoticeable. The openness of the world and seeming limitless possibilities were something that could not be seen in video games prior to the release of *GTA 3*. Players could either follow the storyline that was prepared by the developers, or they could choose to totally ignore it. In *GTA 3*, players could explore the environment through the means of cars, motorbikes, planes, boats, bikes, tanks, or by walking around. The story of *GTA 3* begins with a cut-scene where "The player's nameless character is being transported to prison with two other convicts when the police convoy is attacked while crossing a bridge" (Donovan, 2010, p. 343). After the attack, the surviving convict leads you to a safe house located somewhere in the Liberty City, where the game takes place. During this trip, the game does a great job showing the player how the city itself interacts with itself and that the Artificial Intelligence is designed very proficiently. The developers at Rockstar North, which was previously known as DMA Design, did a really great job with *GTA 3* and it was one of the best-selling games of 2001. Despite the fact that trending games and products in general tend to spawn numerous imitations and copycats, *GTA 3* did not have such a problem. As Donovan (2010, p. 347) describes it, the reason for this was that "the challenge of creating a virtual world or city of comparable scope or vision was so difficult and expensive."

Donovan also mentions that the only video game development studio that managed to compete Rockstar North was Bethesda in 2002 with their *The Elder Scrolls III: Morrowind* from *The Elder Scrolls* series. Even Rockstar North was not able to achieve this with their previous *GTA and GTA 2*, which offered only a top-down view. Despite there were 3D games, in overall they looked like 2D games. Even though, *GTA 3* was not the first game that tried to provide players with the freedom to go wherever they wish it certainly was the first game that truly gave the players such a feeling.

2.17 From RTS to MOBA to RPG

In July 2002, one of the most popular real-time strategic (RTS) games *Warcraft III: Reign of Chaos* was released (*Warcraft III: Reign of Chaos Review*). Developed by Blizzard Entertainment, *Warcraft III* tests players' strategic and tactical abilities. The game takes place in the fantasy realm of *Warcraft* franchise. Not only it had a lengthy, difficult and story-rich single-player campaign, where players have to complete missions with various tasks, but it also came with the World Editor, where players could create maps and game types for others to play. Through *Warcraft's* World Editor, several great user-made maps were created by a few very innovative people. One of the most known user-made maps for *Warcraft III* was *Defense of the Ancients* or *DotA*. *DotA* was unique and it attracted a great number of players. It focused mainly on the Player vs. Player aspect. The creator of *DotA* called Eul basically created a new genre of video games called MOBA – Multiplayer Online Battle Arena. (Minotti, 2014). Even though *DotA* was not the first user-made map that shared similarities of MOBA games (a similar concept was created in 1998 for the game *Starcraft*, which was developed by Blizzard), people consider *DotA* as the first user-made map that started the MOBA genre (Minotti, 2014). A typical match of *DotA* consisted of 2 teams of 5 people. Each team has a base on opposite sides of the map and the goal of the game is to destroy the enemy base. But the difference is that each player commands her/his hero, which was a special unit in *Warcraft III*, instead of a whole army.

A year later, in July 2003, Blizzard released an expansion pack for *Warcraft III* called *Warcraft III: The Frozen Throne*. This expansion pack was a sequel to the *Warcraft III: Reign of Chaos*. Filled with a new campaign that is a continuation of the story in previous *Warcraft* it also introduced several improvements to the World Editor (*Warcraft*

III: The Frozen Throne Review). This allowed creators to upgrade their previously designed maps, including *DotA*. Later on, numerous variations of *DotA* were created by different creators, but Steve Feak put them all together and created *DotA Allstars*. (Minotti, 2014). Once Feak stopped updating his creation, he let a different modifier (modder), who went under the alias IceFrog, to take care of *DotA Allstars* (Minotti, 2014). Both of them created different versions of MOBA games that are based on *DotA* for different video game developers in the following years (Minotti, 2014).

Blizzard, however, did not participate in this and its developers released another game that revolves around the *Warcraft* universe called *World of Warcraft* in 2004. The gameplay in *World of Warcraft (WoW)* was entirely different from the previous *Warcraft* series. The top-down view was replaced by a third-person view. Instead of controlling multiple units at once, players control only one character, who was created based on the player's preferences. Instead of being trapped in one map per mission, players can explore the whole *World of Warcraft* when they wish to do so. In other words, Blizzard switched from a real-time strategy game to a role-playing game. One of the reasons behind this change is probably the fact that the developers at Blizzard spent a lot of their time playing different MMORPG's (Massively Multiplayer Online Role Playing Game) like *Ultima Online* or *EverQuest*. (Donovan, 2010). Both *Ultima Online* and *EverQuest* were released a few years prior to *WoW*. As the developers themselves said: "We felt that once you got into those games, once you got past the really steep learning curve and some of the rules that made them unappealing to a more casual core audience, they had so much immersion and stickiness" (Donovan, 2010, p. 306). In order to appeal to a larger audience, Blizzard's developers simplified the gameplay of *WoW* and they also introduced quests, which gave players a sense of direction. (Donovan, 2010) Since its release in 2004, *WoW* received numerous expansion packs and it is the most popular MMORPG to this day.

2.18 Online video game stores

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Nowadays, a huge amount of people prefers to buy video games via online game stores. It is convenient, quick and in many cases cheaper than the physical copy. Such a convenience, however, was not available a few years ago. The trend of online video game stores was presented in 2004 by Valve, when the American video game developer and publisher released the sequel to *Half-Life* named *Half-Life 2*, in form of Steam. Steam is the most popular online video game store for PCs. It gained its early popularity through a condition that was set by Valve in 2004. As Donovan (2010, p. 362) describes it: "In order to run *Half-Life 2*, PC owners were required to install Steam, an iTunes-esque application that managed their games and allowed them to buy new ones." At first, Valve sold only their own games through Steam, but in 2005 they allowed other video game developers to sell their games through Steam. Nowadays, Steam is known among most of the PC users that enjoy playing video games, mainly thanks to the Steam sales, which are conducted several times a year, during which people can buy most of the games advertised on Steam very cheaply. Although, Valve was not the first one that sold games online, but it was the first one that successfully managed to create a functional online video game store that sends digital copies through the means of the internet instead of physical copies via mail.

Valve was not the only company that decided to sell video games online. Microsoft, Sony and Nintendo followed this trend as well. Microsoft created an online video game store called Xbox Live Arcade for their newly released game console Xbox 360 in 2005. Sony created its online video game store called PlayStation Network for their new console called PlayStation 3 in 2006 and Nintendo created its own online video game store for their newly released game console Nintendo Wii that was released the same year.

2.19 Nintendo goes against the flow

While Microsoft and Sony tried to prove that their consoles have the highest definition graphics available, Nintendo chose a different approach. Instead of focusing on having the best hardware possible, Nintendo tried something new and innovative. Despite the fact that Nintendo Wii was considered to be the weakest game console during that time, it became more popular than the PlayStation 3 and the Xbox 360 (Donovan, 2010). The controllers for Nintendo Wii served the purpose of capturing the movement of player's hand, which was projected in-game.

This allows people to feel like the in-game character because the character replicates their moves in real time and the most popular game for Nintendo Wii *Wii Sports* demonstrates this very efficiently (Donovan, 2010). Players could enjoy a game of tennis, bowling, golf, and other sports in their very own living rooms. It was very simple and fun to play, which is probably the reason why Nintendo Wii was so popular, even among those who had never played video games before.

2.20 The choice is yours

Most video games have a story. In some video games, the story is not the most important element of the video game, therefore, players simply do not pay attention to it. In other video games, the story is the most important aspect of the game. Most of the story-driven video games do not allow players to change the outcome of the story, but a handful of video games offer players the opportunity to change the story of the video game and even a lesser number of games offer players multiple ends of the story. There are also games that try to question players' morality.

One of these games is *Mass Effect*, which was released in 2007. (Donovan, 2010) *Mass Effect* is a role playing game, where players control Shepard, who can be customized according to the players' desires and who is one of the most important characters of the story. (Bissel, 2010). The game gives players two options, which not only affect the story, but also pose a slight moral dilemma for the player, right at the beginning of the game. Players have to choose Shepard's background and psychological

profile (Neltz, 2013). *Mass Effect* is just the first part of the *Mass Effect* trilogy. The story of *Mass Effect* is complicated, and it takes place several years after people made the first contact with a mixed community of aliens. (Bissel, 2010). The player who plays as Shepard then has to face numerous decisions throughout the game, one of them is deciding, which member of your crew will survive and which one will die (Neltz, 2013). Needless to say, these decisions do affect the story further on, although some parts of the story remain the same.

In *BioShock*, which was released in the same year as *Mass Effect*, players control Jack, who is the game's protagonist. The story of *BioShock*, which takes place in an underwater city of Rapture that was created by Andrew Ryan, is controversial with an amazing plot-twist near the end of the game. Rapture that was originally meant to be a utopia is in disastrous condition due to a civil war. Jack is the unfortunate one that found the city of Rapture, due to a plane crash in the middle of an ocean. After the plane crash, players control Jack as he tries to get away from the plane. He gets to a lighthouse, which is built on an enormous rock just few meters next to the spot where the plane crashed. Even though the lighthouse seems suspicious and out of place, it looks safer than the remnants of the plane. Once players enter the lighthouse, Jack sees an underwater transportation device called Bathysphere. The bathysphere transports the player to Rapture, where the rest of the game takes place. Residents of Rapture have got crazy or killed by this point, due to ADAM and the civil war. ADAM is a liquid that was created by scientists in Rapture. It modifies human genes and gives people superhuman abilities. As players progress through Rapture, they need ADAM in order to improve their abilities. The choice how to obtain ADAM is where players' morality is tested. They can either kill Little Sisters, who were created in order to collect ADAM, and receive a full dose of ADAM, or they can save them and receive half of the dosage. This also affects the outcome of the story.

Another game that tests players' morality is *Fallout 3*, which was released in 2008. The story of *Fallout 3* takes place in an alternate universe, where the US and China attacked each other with nuclear weapons of mass destruction (Bissel, 2010). *Fallout 3* offers players choices from the beginning. Instead of a boring and seemingly redundant tutorial, *Fallout 3* follows the birth and growing up of the player's character. During this time, players create and customize their characters according to their wishes and they get

to know the controls. Bissel (2010, p. 10) describes it as “the most streamlined, narratively economical, and interactively inventive go at it yet.” During the tutorial, players can talk to residents of Vault 101, where a community of survivors, including the player’s character, resides. This way, players can either create friends, or enemies, depending on player’s response. The game also has a Karma system. Each player’s karma changes depending on his/her actions. This gives players a bit of sense and it tries to label your actions as good or bad, thus the player can decide to either be good, bad, or something in between the two. The most shocking choice is when players are tasked to defuse a bomb in order to prevent it from exploding and destroying a city in the process. While it seems simple and straightforward, players can also choose to detonate the bomb for a certain amount of in-game currency. Needless to say that choosing the latter option results “in a karma loss of 1000 – the lowest you can sink in the game” (Barratt, 2009).

All of the games give players moral dilemmas, thus, players can test their character. Despite the fact that these games were not the first one to do so, they do it in a very proficient way and most of the times, choices in these games affect the story, as well as the response of other non-playable characters to the players’ character.

2.21 DotA Respawned

As it was mentioned in chapter 2.1.17 *DotA* was very popular. Steve Feak, who created *DotA Allstars*, joined Riot Games, which was created by Marc Merrill and Brandon Beck (Minotti, 2010; Gaudiosi, 2013). In 2009, Riot Games was able to create the most popular MOBA game called *League of Legends (LoL)*. Both *DotA* and *LoL* are fairly similar. Top-down view, numerous unique characters, goal of the game, relatively short matches, and etc. The difference between the two is that *LoL* is free to play, whereas players had to own *Warcraft III* in order to play *DotA*. Another difference is that *LoL* has more playable maps, but players can choose from a very limited pool of champions (playable characters with unique abilities and lore in *LoL*) in the beginning. In *DotA*, players could choose any hero (a playable character with unique abilities and lore in *DotA*) as long as the game mode allowed to do so (the administrator of the game always decided at the beginning of a *DotA* match whether the hero selection is going to be random or not). If players want to have all the champions in *LoL*, they have to unlock

champions by buying them either with Influence Points, which players obtain by finishing a match, or Riot Points, which can be purchased with real money through the *LoL* store. Then there are free champions, which are different each week. *LoL* has 3 map types, whereas, *DotA* only had one. In *LoL* players can either play for fun, or they can try to improve their position on the region's ladder.

LoL became very popular and it has its own e-sports tournaments, where players from all over the world can participate. The winner gets the Summoner's Cup and the prize money. *LoL* definitely was not the first online multiplayer game that holds its own e-sport tournaments, nevertheless, it surely holds the biggest e-sport tournaments.

2.22 Interactive video game film

Different video game developers focus on different video game genres. Some prefer action-packed video games, others prefer strategy and some like to combine elements from different genres. One video game genre that could not be seen very often until 2010 is interactive video game films. The reason why many video game developers did not produce interactive video game films is probably the fact that the in-game characters did not feel human enough, as the possibilities for video game developers were quite limited due to the hardware capabilities. In 2010, however, technology was far better than a decade or half a decade ago and during the same year, Quantic Dream, which is a French video game developer, released *Heavy Rain*.

Heavy Rain has one of the best stories in video games and players decide its outcome. Despite the fact that *Heavy Rain* has a lot of action in it, the beginning of the game is rather calm and slow, depicting one of the game's main characters, Ethan Mars, as a father of a normal and happy family, who has a beautiful wife and two sons. The game's relatively happy theme shifts to a gloomy and dark at the moment when Ethan is unable to protect one of his two sons. Ethan's life is drastically changed by this and from this point on, the video game picks up the pace. A few minutes after the accident occurred in the game, players control Ethan, while he is playing with his second son Shaun in a public playground. During this time, Ethan experiences a blackout, which has happened to him several times after the accident, and when he gets his conscience back, he is unable

to find Shaun. This sets off a chain of events. Ethan discovers that his son Shaun was kidnapped by the Origami killer, who is infamous for kidnapping and drowning young boys. The Origami killer contacts Ethan via mail and instructs him to pick up a package, which contains a gun, a mobile phone, a memory card and 5 pieces of origami. Each piece of origami has a task written inside of it. If the player successfully completes one task, s/he is rewarded with a few letters of the address where Shaun is held captive. During the game, players also control different characters who have their own problems and backstories, however, most of them try to solve the mystery that is surrounding the Origami killer. Over time, however, their stories get interconnected and once the individual pieces of the puzzle fall together the whole story of *Heavy Rain* is revealed. The controls of the game are very simple, but one can easily fail during the quick time events (QTE), during which players have to press correct buttons in a sequence in a small amount of time. These QTEs usually occur during action scenes, where the player has to run or protect him/herself. The game has multiple endings and it is only up to the player's skill, which one s/he will receive. Unsuccessful QTEs can even result in death of some of the main characters and instead of a 'Game Over' screen, the ending of the game will be affected. While playing *Heavy Rain* players also have to face quite difficult moral dilemmas. One of them occurs while they are playing as Ethan, where he is tasked to kill a man who is a drug dealer but also a father of two daughters. This presents a moral dilemma for players and they have to choose whether they will kill the man or not. If they do, Ethan will obtain several letters of the address where Shaun is held captive. If they spare the person, they will not receive the letters, but they spare a human being, who is a father to two daughters.

Heavy Rain was not the first interactive video game film. The game *Indigo Prophecy*, also known as *Fahrenheit*, which was developed in 2005 by the same video game developer, was one of the few that came before *Heavy Rain*. Nevertheless, *Heavy Rain* is an outstanding video game that will make you feel as if you were present in the film.

3 Video game peripherals

All video game peripherals can be considered a computer peripheral, but not all computer peripherals can be considered a video game peripheral. First and foremost, it is important to state the difference between a computer peripheral and a video game peripheral.

A computer peripheral “is a device that is connected to a computer but is not part of the core computer architecture” (Zandbergen, P.). According to the website, they can be divided into input, output and memory peripherals (Zandbergen, P.). Video game peripherals share the same condition but have another condition, which is that a video game peripheral allows players to play games or it enhances players’ experience of a game. This includes many different types of controllers as well.

Over the course of the video game history, there were several video game peripherals that were either something that players craved for or something that was considered to be a useless piece of overpriced junk. Several of the better peripherals, however, stand out more than the others.

3.1 Unleash your inner rock star – *Guitar Hero* peripheral

One of the most famous video game peripherals is definitely the guitar controller for the *Guitar Hero* video game series. The first *Guitar Hero* was released in 2005 and it was packaged with a guitar controller. (Donovan, 2010) Even though that *Guitar Hero* was not the first video game that was meant to be played with a guitar controller, it certainly made the guitar controller popular. The controller is perfect for the game’s purpose. It resembles a regular electric guitar, but instead of strings it has a strum bar and 5 different coloured fret buttons. To play with the guitar controller, players have to hold down specific fret button/s according to coloured notes that appear on the screen and they have to press the strum bar in the exact moment as the notes pass through the targeted area. The controller can be either wired or wireless. The latest guitar controller design consists of 6 fret buttons, as it can be seen on the official website of *Guitar Hero Live*

(Guitar Controller). This was made in order to make the game easier for beginners (using only 3 fret buttons) and harder for experts (using all 6 buttons) (Guitar Controller).

The controller is supposed to give players the feeling of a guitarist of one of the most popular rock/metal bands. Each *Guitar Hero* game features several popular classic rock songs and some songs of the lesser known bands. All of them can be played as the player progresses through the game. Latter *Guitar Hero* titles also allowed players to play together like a band as well. This included a whole rock band kit - drums, two guitars and a microphone – which is awesome for playing with friends, colleagues or family.

3.2 Steering wheel/Racing simulators

Another popular video game peripheral is a steering wheel that usually includes gear shift and pedals that form a simple racing set for avid or casual racing game players. The first racing set was created as early as 1974 for Atari's *Gran Trak 10*, which consisted of a racing wheel, gear shift and pedals (Donovan, 2010). Since then, different manufacturers made different variations of steering wheels. There are simple steering wheels which can be attached to most types of desks and many of these sets are affordable to a general customer. Those who enjoy racing games like *Gran Turismo*, *Need For Speed*, or *Collin McRae Rally* (all of which are quite popular racing series), would without a doubt enjoy playing them with a steering wheel instead of a keyboard or controller, as it is supposed to give players the feeling of driving a sports car.

The most recent and expensive racing sets provide players with even more immersive gameplay. This is achieved due to a construction called racing rig with a comfortable seat, to which the steering wheel, pedals and gear shift can be attached. The more advanced racing rigs, such as the CXC Motion Pro II, boasts that it gives the players the feeling as if they truly were behind the wheel of a racing car (How It Feels). It includes the steering wheel, pedals, gear shift, in addition to a high-resolution screen which is right in front of the player, a surround sound system mounted onto the construction and a low-mass motion system that “is lightning fast for rapid-transition g-forces and able to accurately replicate the many other forces that act on a moving racecar” (How It Feels). All of this is done to provide the player with the most realistic racing simulation possible.

3.3 Let me see you move – *Dance Dance Revolution* dance mat

Most of the video games are played while staying in a static position, which is usually sitting and staring at a screen, but there are several games where players must move in reality in order to play the game. One of the first games that build upon this concept was *Dance Dance Revolution* in 1998, in which players ‘had to dance in time to on-screen prompts by stepping on large metal buttons’ (Donovan, 2010, p.285). The game was a huge success mainly because of its uniqueness at the time and it was undoubtedly one of the most popular arcade games. It was later converted into a home version and Konami was making dance mat controllers (Donovan, 2010). The *Dance Dance Revolution* popularized this type of gameplay and different companies would later build upon this concept in the future. Nintendo was one of them.

3.4 Bii Fit – Balance board for *Wii Fit*

In 2006, Nintendo released its new console Nintendo Wii which utilized the concept of moving the player’s body in order to play a video game. Nintendo proved that this concept is enjoyable and that people crave for it with its *Wii Sports* that was mentioned earlier in chapter 2.1.18. Therefore, in 2007 Nintendo released *Wii Fit* that was packaged with a Balance Board controller. The Balance Board was designed specifically for the *Wii Fit* game and it measured the position and weight distribution of the player who was standing on it (Donovan, 2010). The game instructed players during each type of exercise or sport activity.

The main purpose of *Wii Fit* was to make people healthier and to make exercise an enjoyable activity even for those who would rather spend their time playing a video game. Of course, people are sceptical about it and according to Cedric X. Bryant, Ph.D, Fellow of the American College of Sports Medicine, and a chief science officer of the American Council on Exercise, ‘In terms of skill, balance, coordination and agility are important for our functional capabilities, but they don't equate to how fit a person is’, however, ‘If you're going to substitute giving your thumbs a workout with the Wii video games for a Wii exercise game, that's a good choice, in terms of actual activity and caloric expenditure’ (Robertson, 2008).

Scepticism and doubts aside, *Wii Fit* in cooperation with the Balance Board does a great job at getting people off their seats and making them move, though in a different fashion in comparison to *Dance Dance Revolution*.

3.5 You are the controller – Xbox Kinect

Speaking of making people move, Nintendo was not the only company that tried to compel their players to get off their seats. In 2010, Microsoft released their new gaming peripheral for their console Xbox 360 called Kinect. Essentially, Kinect allows players to act as a controller for the console. Whether players navigate the Xbox menu or play a game, they do all of it by moving specific body parts, usually their hands. The Kinect tracks player's whole body and his/her movements, which are transferred to the console. Kinect also has a voice and face recognition; thus, players can give Kinect voice commands to control several features. It sounds great; however, Kinect has several disadvantages as well.

First, it is quite expensive for an additional gear for the console. Second, players need a lot of free space in the room in which their Kinect will be placed, otherwise they could bump into furniture and potentially hurt themselves. Third, the tracking sometimes lag behind the real-time movements of the players. Fourth, the game library for Kinect is not as vast as for the Xbox 360 itself. Many Xbox360 games cannot be played via Kinect, however, some games can use Kinect for additional in-game features, such as voice commands. Fifth, if two players are playing at the same time, it can lead to some injuries or unintentional slaps, e.g. when playing a dancing game.

Kinect certainly is not a must have item for Xbox 360 users, however, it certainly does not have shortage of fans. Kinect can be a great gadget for playing with friends, family, or random people at a party as it gives people the feeling of truly playing the game and being their in-game character, instead of just sitting and playing with a controller.

3.6 Virtual reality

All of the gaming peripherals mentioned above tried to bring something new while the main purpose was to get players immersed in video games. Out of all of the mentioned peripherals, Kinect was the closest to make players feel the gameplay immersive. However, nowadays people can purchase gaming peripherals that can alter the reality around them so proficiently that it makes them feel as if they actually were in a different reality.

There are different manufacturers in the field of virtual reality. The most popular are Sony, HTC and Oculus. All of them focus on making the virtual reality as believable as possible. In order to persuade a person's mind, in terms of creating a virtual reality, it is necessary to deceive as many of his/her five senses as possible. The most crucial ones are sight and hearing. The sound of the real world can be easily blocked by headphones which also can produce the sound of the in-game world. The tricky part was in deceiving the vision by replacing the real world with a virtual one. Each of the three mentioned companies managed to do this with a special type of headset, which basically replaces the real-life vision with an in-game vision.

3.6.1 HTC Vive, Sony PlayStation VR and Oculus Rift

Each of these companies has their own virtual reality headset. The general idea and the concept of these headsets are more or less the same. All of them can be attached to a person's head and they are relatively comfortable. Each of them contains two separate lenses that divide the vision into two screens and their main purpose is to deceive a person's mind into thinking that s/he is in a different reality. However, each of these headsets differs from each other in several aspects.

SONY PlayStation VR is probably the most accessible virtual reality headset, due to its \$400 price tag and the cost of a PlayStation 4 (PS4) which is approx. \$400 - \$300 (GameStop, 2017). However, customers that are interested in it will have to spend at least another \$60 for the PlayStation Camera, which is not packaged with the PS VR (Greenwald, 2016). The resolution for PS VR is 960 by 1080 pixels per eye and the

refresh rate of the VR display is 120 Hz, resulting in a smooth motion. The headset must be connected to a PS4 in order to run. Most of the games for the PS VR can be played only with a regular PS4 controller and the video game library is fairly substantial. There are also a few games for PS VR that can be played with PlayStation Move controllers that are tracked by the PS Camera. The tracking is very accurate, however, players always have to hold the controller in the field of vision of the PS Camera, otherwise it will not be able to track the controllers (Greenwald, 2016). Playing this way enhances the feeling of being present in the virtual reality, rather than just sitting on a couch and playing with the PS4 controller.

Oculus Rift and HTC Vive are relatively similar to each other. Both of them have to be connected to a relatively high-end computer in order to run properly. This already makes it more expensive in comparison to the PS4, unless they already own a high-end computer themselves. In comparison, a self-built computer can meet the minimum/recommended requirements for approx. \$800 because a self-built computer is usually much cheaper than a pre-built computer (Connolly, 2017). This obviously makes the PS VR much more accessible. Both Rift and Vive have the same resolution (1080 by 1200 pixels per eye) and refresh rate (90 Hz).

Nowadays, both Vive and Rift support the room-scale VR. Basically, the room-scale VR means, that the user is capable of moving around the room in a pre-determined space while using motion controllers, which transfer the user's actions into the game (Jagneaux, 2016). The room-scale is possible due to the tracking devices of each of the VR headsets.

The Vive utilizes their Lighthouse Tracking System. Each HTC Vive is shipped with two lighthouse base stations and two motion controllers. The lighthouse base station consists of two lasers, a horizontal laser and a vertical laser, that sweep the area in order to track the VR headset, both motion controllers and the general area (Kreylos, 2016). These lighthouse base stations have to be aimed at the area, in which the user intends to move around, and the base stations should be facing each other. Additionally, the base stations have to be placed above head level. Mounting them on a wall is one of the easiest solutions (Jagneaux, 2016). The Vive headset and motion controllers are covered with sensors that are constantly scanned by the lighthouses. Due to this, the Lighthouse

Tracking System provides a very accurate tracking and it allows users to move around freely (Jagneaux, 2016). All of this have been available to the users from the initial release of HTC Vive and it costs approx. \$800 (Swider, 2017).

On the other hand, the Oculus Rift did not initially have its own motion controllers and it was shipped only with a single tracking camera and an Xbox One controller (Robertson, 2016). Nowadays, the Oculus Rift supports the room-scale VR as well. The Rift has its own tracking system, which consists of tracking cameras. If a user wants to use the Oculus Rift for the room-scale VR, three tracking cameras are recommended, as it proved the user with larger play-space (Jagneaux, 2016). Similarly to the Vive, the Rift headset and the Oculus Touch, which are motion controllers designed for the Oculus Rift, are “studded with infrared LEDs and monitored by cameras plugged into the computer” (Robertson, 2016). Despite the fact that the Oculus Touch was released remarkably later in comparison with the HTC Vive motion controllers, its design is significantly better. It consists of two controllers that fit perfectly to the user’s hands (Robertson, 2016). These controllers have a set of capacitive sensors, which scan the position of the user’s fingers. Therefore, if, for example, the index finger of the user is not placed on the controller, the in-game index finger is pointing outward (Šubák, 2016). This is a great enhancement of the VR experience.

3.6.2 Locomotion in virtual reality

The room-scale VR may sound awesome in theory, but reality may be a bit different. It mainly depends on what customers expect from the room-scale VR. There are great VR video games that provide a fun experience within a limited move space. However, most video game players are used to explore large virtual worlds and most VR video games do not allow that at this moment. The reason for that is because moving through a virtual space causes motion sickness for most of the people, as the virtual reality interferes with the vestibular system (Maiberg, 2016).

The vestibular system provides “information about motion, equilibrium, and spatial orientation” (Vestibular Disorders Association, 2016). In case of the typical locomotion in VR, which is moving around with a keyboard or a controller by pressing

buttons, the player's vision is sensing a motion, but at the same time the vestibular system is not sensing any motion. This is the cause of the motion sickness. In order to prevent the motion sickness, many VR video game developers create their games by completely avoiding the locomotion in the VR or by allowing the players to move around the virtual space by some other method than just holding down a "move" button.

Some video games utilize teleportation to a nearby location. Different video games have a different type of teleportation (Carbotte, 2016). Some use a basic point-click type, which means that players point their controller to a desired location and press a button to teleport there. Some games combine the teleportation with moving around a limited space (Bumble, 2016). While the teleportation is not prone to cause the motion sickness as much as the typical locomotion, it is still something unnatural for people. Some video games utilize a "walk-in-place" method. Basically, the user walks in place, which propels him/her forward inside the virtual reality. Players have to either look in the direction to where they want to move or they choose the moving direction with the VR controller, depending on the type of used technology (Bumble, 2016). This is probably the most natural locomotion option for the VR at the moment as both the vestibular system and the vision of the player sense movement.

The problem with VR locomotion is that players cannot move too far away from the computers (HTC Vive, Oculus Rift) or PlayStations (PS4 VR) as the VR headset has to be connected to a fairly powerful computer and the cable has a limited length. This problem could be solved by virtual reality motion platforms. These platforms allow players to move in a very small area, while providing limitless movement in the virtual reality. There are multiple developers that are trying to create a functional omnidirectional motion platform that would be able to transfer the player's movement into the virtual reality and some of them have already succeeded by creating a working prototype. For example, the Virtuix Omni is one of the few, if not the only VR motion platform that can be purchased by customers as a fully functional omnidirectional motion platform.

The Omni, developed by Virtuix, is an omnidirectional motion platform that "translates movements to keystrokes, analog gamepad input, or a direct input into the

game” (Kren, 2016). For any additional commands, such as using an item or firing a gun, a gamepad, or other type of controller with the necessary buttons is required. A virtual reality headset has to be worn while using the Omni.

The player is standing inside of the support ring. A safety harness, which is supposed to keep the player in place while moving, is attached to the ring. The sensors located in the support ring track the player’s movements. Additionally, a pair of special shoes with a tracking pods are required. The shoes have a sole with low-friction; they stabilize the player’s feet and walking with them on the concave shaped Omni platform should feel natural (Products, 2017). The tracking pods are to be attached on the Omni shoes and they “accurately track the movement of each foot at all times with no noticeable latency” (Virtuix Omni Tracking Pods, 2017). Therefore, the player can walk in one direction and look at another one at the same time (Durbin, 2016).

The Virtuix Omni in the combination with a virtual reality headset provides one of the most immersive virtual reality experiences to this day. However, it can only be purchased in the U.S. Their official website states that internationally (excluding the USA), Virtuix Omni can only be purchased as “a commercial edition of the Omni that includes commercial licensing fees for our software and games”, meaning, that it is only available for commercial or development purposes (Virtuix Omni Package, 2017) The cost of the Virtuix Omni in the U.S. is approx. \$700 (Shanklin, 2016).

The combination of the motion platforms with virtual reality is an excellent idea, however, the virtual reality is still far from being perfect.

4 Impact of video games on society

Video games have been present in the society for a long period of time, counting from the first memorable video game, *Pong*, that was played by a wide public in 1972. The whole video game industry has greatly expanded from this point onward. Nowadays, video games have become a huge part of the today’s society and they have impacted it in multiple ways either positively or negatively. The following chapters will try to analyse these impacts on the society.

4.1 Video game industry

The statistical data contained in this chapter come from the source cited in the references as ‘Video Games In The 21st Century: The 2017 Report’ by Stephen E. Siwek, unless it is stated otherwise. The statistical data refer specifically to the U.S.

Nowadays, the video game industry is capable of standing on its own. Video game developers and publishers release hundreds of video games every year and the video game industry provides multiple job positions that would have never existed without video games.

According to Entertainment Software Association, which provides annual reports, fact sheets and other materials regarding the entertainment software industry in the U.S., the revenue of video game sales in the U.S. has more than doubled since the year 2009 up to 2016. The revenue of video game sales in 2009 were approx. \$10.1 billion, which escalated to approx. \$24.5 billion in 2016. This included only the sales of the software, including both physical and digital video game copies for each type of electrical device (computers, consoles, mobile phones, etc.). The overall revenue of the video game industry for the year 2016, including all the hardware, micro transactions (in-game purchases) and peripherals in addition to the software, reached approx. \$30.4 billion.

According to the same report, there were over 2,800 video game developing and publishing locations combined, located all over the U.S. in 2015. Specifically, there were 2,322 video game developer locations and 526 video game publisher locations. Additionally, there were over 65,000 direct employees in the video game industry. According to the report, 37,122 people were directly employed by video game developing companies and 28,556 people were direct employees of the video game publishing companies. These numbers, however, only comprise of the employee data from 1,682 video game publishing and developing locations, due to the fact that the remaining 1,176 location do not report their employment data.

This means that more than 65,000 people are employed thanks to the video game industry in the U.S. It is important to note that this number does not include people that are indirectly employed by the video game industry.

4.2 English in video games

Many popular video games have English as their pre-defined language. There are many countries that localize video games into their native language, but there are also many countries, where the players have to play in one of the pre-defined languages, usually in English (Uuskoski, 2011). Additionally, English is considered to be the lingua Franca in online video games (Sundqvist, 2009). Considering the fact that many video games are played in English, there is a possibility that playing video games could potentially improve the players' English to a certain extent.

Students at most primary schools come to contact with English in a form of a compulsory subject. Some students also come to contact with English out of their school by engaging themselves in some sorts of linguistic activities in English, which is often referred to as Extramural English (EE) (Sundqvist, 2009). Students may prefer different types of EE, such as listening to music, reading books, playing video games, etc. The EE can have an impact on the students' English and some studies even examine possible effects of the EE on students' English skills (Sundqvist, 2009, Uuskoski, 2011).

For example, a study done Pia Sundqvist, whose target group were Swedish 9 graders, was collecting data regarding the possible effects of EE on the oral proficiency and vocabulary of the students. The data were collected over a one year period. During her research, Sundqvist found that the results of correlation between EE and vocabulary of the students were statistically positive and significant. She also found that different EE activities had a different relative importance for the results on vocabulary tests and "playing video games", along with "internet surfing" were the most relatively important EE activities for the vocabulary improvement (Sundqvist, 2009). A similar finding was mentioned in a study conducted by Olli Uuskoski, where she refers to a study conducted by Liss Kerstin Sylvén, who concluded that involving oneself with many EE activities,

like playing video games, watching TV or surfing the internet, “showed that the most significant factor for vocabulary improvement” (Uuskoski, 2011).

Additionally, Uuskoski’s study, which was done on almost 500 upper secondary school students from Southern Finland, found that there is a scientifically significant positive correlation between high grades from English and time spent by playing video games, on average. Uuskoski divided the students into four groups based on time spent playing video games on a weekly basis. According to the results it looks like that “on average, the more active gamer group one belongs to, the better their English grades are” (Uuskoski, 2011, p.31).

These studies argue that the connection between students of Sweden and Finland who are learning English and playing video games is quite undeniable, however, it does not necessarily mean that playing a tremendous amount of video games automatically results in good grades in English (Uuskoski, 2011, Sundqvist, 2009). Uuskoski admitted that matters such as this one need much more empirical studies, as “the results of her study are still only preliminary” (Uuskoski, 2011). Despite this, it seems that playing video games does contribute to the English skills of the players as most of the students in the Uuskoski’s study said that they feel like their English has improved at least to some extent by playing video games (Uuskoski, 2011).

4.3 Gaming as a job? – eSports and professional gamers

Playing video games can be viewed as a means of pastime for some and as a future career for others. This is because many video games are praised for their competitive gameplay. As in many different types of competitive activities, such as football, basketball, chess, etc., it is enjoyable to watch the best players in their field to compete with each other. Video games are no exception.

There is quite a large number of competitive online video games, through which the most skilled players can earn quite large sums of money (Top Games Awarding Prize Money, 2017). This is because there are many tournaments in which players compete

against each other, mainly for the title and prize money. All of this could be covered by one word; eSports.

This relatively new phenomenon, which stands for electronic sports, has been receiving a lot of attention. According to Newzoo, a company that claims to be “the leading provider of market intelligence covering the global games, eSports, and mobile markets” (Our Story, 2017), the number of e-sports viewers are rapidly increasing. According to their annual reports, the number of e-sports viewers has increased from approx. 204 million viewers in 2014, where approx. 114 million were occasional viewers and approx. 90 million were e-sports enthusiasts, to 323 million viewers in 2016, where 161 million were occasional viewers and approx. 162 million were e-sports enthusiasts (NewZoo, 2016, Draper, 2017).

As it was already mentioned previously, numerous games belong to the eSports, three of which could be considered the most popular, according to the number of players that watch them and according to total prize pools for each one of them. These games are *Counter Strike: Global Offensive (CS:GO)*, *Dota 2* and *League of Legends (LoL)*. *CS:GO* is a tactical first-person-shooter game. *Dota 2* and *LoL* are fairly similar and both of them are Multiplayer online battle arenas, where the goal is to destroy the enemy base.

Each of these games, among all the other eSports games, stream their tournaments live on Twitch, “the world’s leading social video platform and community for gamers, video game culture, and the creative arts” (Twitch – Social Video for Gamers, 2017). According to Newzoo, the three previously mentioned games were the three most viewed video games on Twitch, from August 2015 up to March 2017 in terms of eSports streaming; except for September 2015, when *LoL* was the 4th most watched eSports game and August 2016, when *CS:GO* was the 4th most watched eSports game (Most Watched Games On Twitch, 2017). For example, the amount of watched hours of online *LoL* eSports stream during the March 2017 was approx. about 27.8 million hours (Most Watched Games On Twitch, 2017). Additionally, the number of people watching the eSports are enormous as well. For example, the 2016 *LoL* championship was watched by 43 million unique viewers (Kennedy “Bradmore” J., Rozelle “Magus” W, 2016).

In terms of prize pools, *Dota 2* has the largest total prize pool of all eSports games since its release. According to e-Sports Earnings, which is “a community-driven, competitive gaming resource based on freely available public information”, the total prize pool for *Dota 2* is \$99,291,136.92 (Dota 2, 2017). The second one is *LoL* with \$39,481,109.66 and the third one is the *CS:GO* with \$31,874,650.36 (Counter-Strike: Global Offensive, 2017, League of Legends, 2017).

4.4 Medicine and video games

Video games can have an impact on many different parts of society and medicine is no exception. They can either have a positive impact on patients' health, or they can help medical students to improve or teach some medical skills (Kato, P., M., Video Games in Health Care: Closing the Gap). In a peer-review done by Professor Pamela M. Kato, Ed.M., Ph.D., who is „an internationally recognized expert on serious games known for facilitating industry and academic relationships to deliver engaging and impactful gaming solutions for health in vertical markets“ (Home – Pamela M. Kato, EdM, PhD., 2017), several studies aimed at the impact of video games on treatments of patients and possible improvements of medical students were reviewed.

4.4.1 Video games for patients

According to the review, even commercial video games can help patients with different problems. A study done in 1987 on two groups of young oncology patients showed that the group that was playing video games on Atari 800 XL for 10 minutes during the chemotherapy session „significant decreases in reported nausea compared with control patients“ (Kato, 2010). The second group could only distract themselves with toys, books, TV or non-digital games, which only suggested that video games provide a greater amount distraction, which helps the patients in such a situation.

A different study was aimed at the management of anxiety of paediatric patients (aged 4 to 12) that were about to undergo an elective surgery (Kato, 2010). The patients were divided into three groups. Patients in the first group had a parent with them, as all the other groups, but the second group was given a pre-operative sedative and the third

group could play video games on a handheld device (Kato, 2010). Surprisingly, the third group, just like the sedated one, showed almost zero increase of patients' anxiety level from the beginning until the administration of the anaesthesia, whereas the first group showed a significant increase of the anxiety level prior to the anaesthesia. This means that video games can serve as a means of distraction, which is a lot cheaper and more accessible method of anxiety management (Kato, 2010).

Additionally, not only commercial video games can help patients. Video games designed for specific problems proved to be useful as well. For example, *SnowWorld*, a virtual reality game in which the player progress through a cool environment and can shoot snowballs on several targets (snowmen, penguins, etc.), has proven to be effective in pain reduction for burnt patients that were currently undergoing a fairly painful procedure of burnt skin removal known as burn debridement (Kato, 2010).

Another example is a game called *Re-Mission*, in which the patients play as a nanobot Roxxi that is fighting the cancer inside of the different patients (Kato, 2010). The game is intended mainly for adolescents with cancer. This game was used in a randomized trial, during which the patients were randomly assigned to two groups. One was playing *Re-Mission* and the other (control group) one was playing *Indiana Jones and the Emperor's Tomb*. Those that played *Re-mission* for more than 3 months during the study "maintained higher levels of chemotherapy in their blood and took their prophylactic antibiotic medication more frequently as prescribed than patients in the control group" (Kato, 2010). Additionally, those who played the *Re-Mission* were also showing greater knowledge regarding cancer in comparison to the control group.

4.4.2 Video games for medical students

Several studies aimed at the improvement of the skills of medical students were mentioned in the professor's Kato review. For example, according to the review, a study in 2009 proved that "playing certain video games can improve surgical skills" (Kato, 2010). The study was conducted on medical students, that were divided into three groups. The first group was not allowed to play video games, the second group was allowed to play a chess game called *Chessmasher*, and the third group was allowed to play a first-

person shooter game called *Half-Life* (mentioned in chapter 2.13). The playing groups had to “play between 30 and 60 min a day, 5 days a week, for 5 weeks” (Kato, 2010). Their performance in two virtual reality endoscopic surgical simulators called MIST-VR and GI Mentor II was measured before and after the 5 week period. The result was that the third (*Half-Life*) group’s surgical skill improved in both VR surgical simulators. The second (*Chessmaster*) group improved only in the MIST-VR simulator and the first (non-playing) group experienced no improvements (Kato, 2010).

4.5 Video game addiction

The American Psychiatric Association (APA) has been releasing Diagnostic and Statistical Manual of Mental Disorders (DSM) since 1952 (DSM–5: Frequently Asked Questions, 2017). The DSM is a handbook that is used by health care professionals almost all over the world as it contains “descriptions, symptoms, and other criteria for diagnosing mental disorders “, and it helps to unify the language used by researchers that “study the criteria for potential future revisions and to aid in the development of medications and other interventions” (DSM–5: Frequently Asked Questions, 2017). The fifth edition of the DSM (DSM 5), released in 2013, also includes Internet Gaming Disorder (IGD), in other words online video game addiction (Internet Gaming Disorder, 2013).

The IGD consists of nine symptoms. These symptoms are, e.g. losing or endangering an important relationship or important opportunities (job, education, etc.) by playing an internet game, losing control over playtime of internet games, playing internet games too much while having psychosocial problems, and others (Przybylski et al., 2017). According to the DSM 5, each of the symptoms is weighed equally; a person has to have at least 5 of the 9 symptoms and s/he has to feel a significant distress due to gaming (Przybylski et al., 2017).

The IGD is a potential psychological disorder. This means that there is a lack of researches and studies regarding the IGD. Therefore, APA located it in the Section III, which is a section for potential disorders to be studied and researched before they can be included as a formal disorder in later DSM releases or revisions (Internet Gaming Disorder, 2013).

A quite recent study was aimed at the IGD. It was done on almost 19,000 participants from the U.S.A., the United Kingdom., Canada and Germany (Przybylski et al., 2017). The whole research consisted of four studies, where each of the study groups differed geographically and age-wise. Two groups consisted of participants aged 18 to 24, where one group was from the US (Study 1) and the other one consisted of participants from the UK, Germany, the US and Canada (Study 3), and two groups consisted of participants aged 18 and more, where one of the groups was from the UK (Study 2) and the other one from the US (Study 4) (Przybylski et al., 2017). The study was aimed at several aspects related to the IGD, such as the prevalence rate of IGD in participants according to the DSM 5 or behavioural and clinical differences of participants diagnosed with IGD and participants without the IGD.

According to the study, more than half of the players stated that they do not have any of the IGD symptoms and the number of patients was monotonically decreasing with increasing number of reported symptoms, with only 2.4% of the participants reporting 5 or more than 5 symptoms (Przybylski et al., 2017). However, the number of participants that reported 5 or more than five symptoms and that they also “suffered significant distress due to gaming” was even smaller (Przybylski et al., 2017). The numbers were 1% in the Study group 1, 0.5% in the study group 2, 0.7% in the study group 3 and 0.3% in the study group four. Also, according to the study, the participants with IGD showed higher levels of gaming engagement than those without it (Przybylski et al., 2017). The levels other behavioural effects, such as physical activity (lower in participants with IGD) and social activity (higher in participants with IGD), did show differences, however, the differences were insignificant. The same applies to levels of clinical effects, such as mental health, physical health and social health.

As the study authors themselves concluded, it is necessary to conduct more research and studies, before the IGD is included in the DSM as a psychiatric disorder, as this study did not provide a conclusive evidence of the IGD prevalence in participants leading to a “clinically dysregulated behaviour”, (Przybylski et al., 2017). However, if such a link will be proved, it will mean that approx. 1% - 0.3% of the video game players will be diagnosed with the IGD according to the study.

4.6 Violent video games and real-life violence

There have been several cases of violent acts which people tried to link to the use of violent video games, most usually mass school shootings. One of the most most known violent acts, which many tried to link to violent video games, is probably the infamous Columbine shooting that happened in 1999, in which two students shot 13 people (12 students and 1 teacher), hurt several others and killed themselves in the end (Kent, 2001). However, to link violent video games use to such a behaviour, a study would have to validate such a claim in the first place.

In 2015, the APA Task Force on Violent Media released a review of over 300 studies which were done between the year 2005 and 2013 and which were aimed at the use of violent video games (Applebaum, et al., 2015). This included four meta-analysis that covered the relevant literature from 2005 to 2009. The Task Force concluded, based on the review of the previously conducted studies, that the use of violent video games does influence the players' aggression (Applebaum, et al., 2015). According to the review "decreases in prosocial behaviour, empathy, and sensitivity to aggression" are also related to the use of violent video games (Applebaum, et al., 2015).

However, the review was not able to present sufficient evidence on whether the use of violent video games leads to committing criminal acts or acts of violence. Psychological and neurological changes, just as the criminal or violent acts, were present in the reviewed literature as additional outcomes of some of the studies, but there was not a sufficient amount of evidence that would connect these changes to the use of violent video games (Applebaum, et al., 2015). The possible reason for this could be that "no single risk factor consistently leads a person to act aggressively or violently" (Applebaum, et al., 2015). This means that even though the use of violent video games is considered a risk factor, according to the review, the more risk factors acting consistently on one person could be more likely to lead to "aggressive or violent behavior" (Applebaum, et al., 2015).

The chairman of the APA Task Force stated that there is not enough research aimed at the possible link of people committing violent crimes due to the use of violent video games (American Psychological Association, 2015). The APA Task Force stated

in their review that they tried to minimize their bias. However, almost 230 psychology scholars have expressed their concerns in an open letter addressed to the APA Task Force.

In the open letter, the scholars have criticized the Task Force for being biased as a “pressure to produce “positive” findings is present throughout the review” (Open Letter to the APA Task Force, 2013). The scholars stated that they consider the APA’s policy statement to be flawed, as they have based “several strong conclusions on the basis of inconsistent or weak evidence”, back in 2005 and that research done after the statement “has provided even stronger evidence that some of the assertions in it cannot be supported” (Open Letter to the APA Task Force, 2013). They think that policy statements which are backed-up only with weak and incomplete evidence is bad and that they could damage the credibility of the field of psychology. The scholars think that it would be a lot better if the APA Task Force maintained a more neutral point of view instead of just focusing on the positive findings in this matter, as negative findings in this matter are equally important as well (Open Letter to the APA Task Force, 2013). Therefore, as more than 200 psychology scholars consider the current policy statement of the APA about the use of violent video games in regards to aggression to be biased (Open Letter to the APA Task Force, 2013), it is difficult to conclude whether violent video games or video games in general do affect the aggression of the players. Furthermore, the question, whether violent video games use is related to criminal and violent behaviour of people remains unanswered.

As far the previously mentioned school shootings are concerned, according to Dr. Victor C Strasburger, a distinguished professor of paediatrics at the university of New Mexico (Strasburger, 2017), four potential factors applied to every school shooter that he has treated. “One: They've been abused or bullied. Two: They have mental illness. Three: They are socially isolated. And four: They play violent video games” (Albanese, 2015).

This only shows that playing violent video games was not the only factor, due to which people decided to commit such a heinous crime and it potentially proves, that even though some would “like to link first-person shooter video games and mass murders or even single murders, but that’s virtually impossible to do from a scientific research point of view” as according to Dr. Strasburger “murder is rare, Video games are extraordinarily common” (Albanese, 2015).

Conclusion

The purpose of this bachelor's thesis was to provide a brief summary of the video game history. The thesis also takes a look at popular video game peripherals and at the impacts which video game have had on the society so far. It should provide interesting information to those who are familiar with the video game industry, but mainly to those who are unfamiliar with it.

Video games have contributed to society in several ways. There are positive impacts as well as negative impacts, as nothing can be perfect. There are job positions that would have never existed without video games. Video games are also considered to be a new form of a spectator sport as millions of people all over the world enjoy to watch the competitive scene of the video game community. Additionally, there are several possible impacts of video games on the society, such as improving players' English, mitigating patients' pain or improving skills of medical students. However, there are downsides to video games too, as some studies imply that players can be addicted to video games or that video games can influence players' aggression. The problem is, that video games are still quite a new type of entertainment media, therefore, there is still not enough studies in specific study fields about video games.

Even though, the history of video games is relatively short, it was quite eventful. Video games have evolved from very basic programs that demonstrate computing capabilities of computers to elaborate interactive digital media with the capability to provide hours of entertainment. They can be helpful in some ways, but they should be consumed in reasonable doses. They shaped the society in certain areas and it will be interesting to see how they are going to evolve in the future.

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