



**UNIVERSITY
OF TURKU**

Turku School of
Economics

Professional competence as a by-product of gaming-as-a-hobby

A descriptive survey study

Information Systems Science/Marketing and Value Chain Management

Master's thesis

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13.5.2024

Helsinki

The originality of this thesis has been checked in accordance with the University of Turku quality assurance system using the Turnitin Originality Check service.

Master's thesis

Subject: Information Systems Science/Department of Management and Entrepreneurship

Author(s): Juho Törhönen

Title: Professional competence as a by-product of gaming-as-a-hobby

Supervisor(s): Hannu Salmela, Jouni Similä

Number of pages: 75 pages + appendices 8 pages

Date: 11.4.2024

While the potential harmful effects of video games have been studied extensively, less attention has been given to their potential benefits. This is especially true for the potential benefits to career driving competences. While some research has been conducted on specific competences or contexts such as attention allocation and problem-solving, they are usually either only focused on those specific competences or specific game genres, such as shooter or simulation games. The purpose of this study is to broaden that view to a wider perspective of competence development as a by-product of playing video games as a hobby. Prior literature suggests that there are noticeable similarities between competences that companies' desire and universities aim to develop, with the competences that can be developed by playing video games as a hobby. These attainable and desired competences were used to create a survey targeted at knowledge workers, to find out how they perceive that video games have affected the development of those competences, while also collecting some demographical data to find any meaningful correlations. The number of respondents was $n = 55$ and provided a dataset for analysis using descriptive survey research methodology. The study shows that players also tend to see a positive impact on their competences from video gaming as a hobby, although there is a wide variety across different competences and their subcategories. Altogether, respondents viewed the effect of playing video games as a hobby positively regarding competence development. Additionally, according to the results of the literature review and empirical data, the selection of game genre is directly connected to what competences can be developed, while other player demographical data such as age group and gaming platform seem to only influence how competence development as a side-product of playing video games is perceived by players.

Key words: video games, competence, competence development.

Pro gradu -tutkielma

Oppiaine: Tietojärjestelmätiede / Markkinoinnin ja arvoketjujen johtamisen laitos

Tekijä(t): Juho Törhönen

Otsikko: Ammatillisten kyvykkyyksien kehittyminen viihde-videopelaamisen sivutuotteena

Ohjaaja(t): Hannu Salmela, Jouni Similä

Sivumäärä: 75 sivua + liitteet 8 sivua

Päivämäärä: 11.4.2024

Vaikka videopelien mahdollisia haitallisia vaikutuksia on tutkittu laajalti, niiden potentiaaliin hyötyihin on kiinnitetty selvästi vähemmän huomiota. Tämä pätee erityisesti videopelien pelaamisen tarjoamiin hyötyihin työelämäkyvykkyyksien kehittämisessä. Vaikka joitakin tutkimuksia on tehty tiettyihin kyvykkyyksiin, kuten huomion kohdentamiseen ja ongelmanratkaisuun, liittyen, ne keskittyvät yleensä joko vain kyseessä oleviin kyvykkyyksiin tai tiettyihin peligenreihin, kuten räiskintä- tai simulaatiopelisiin. Tämän tutkimuksen tarkoituksena on avartaa näkemystä osaamisen kehittämisestä videopelien pelaamisen sivutuotteena. Aiemman kirjallisuuden mukaan yritysten ja yliopistojen haluamien ja videopelien harrastuksena pelaamalla kehitettävien kyvykkyyksien välillä on yhtäläisyyksiä. Näitä kirjallisuuden perusteella saavutettavissa olevia ja haluttuja kyvykkyyksiä käytettiin tietotyöntekijöille suunnatun tutkimuskyselyn luomiseen. Sillä selvitettiin, miten he kokevat videopelien vaikuttaneen tietotyössä hyödyllisten kyvykkyyksien kehitykseen. Ohessa kerättiin myös joitain demografisia tietoja merkityksellisten korrelaatioiden löytämiseksi, esimerkiksi vaikuttaako pelaajan ikä tai peliaika viikossa pelaajan näkemys kykyjen kehityksestä. Vastaajien määrä oli $n = 55$, ja se tarjosi aineiston analysoitavaksi kuvailevalla kyselytutkimusmenetelmällä. Tutkimus osoittaa, että pelaajat näkevät positiivisen vaikutuksen kyvykkyyksien kehittämiseen videopelaamisesta harrastuksena, vaikka eri kyvykkyyksissä ja niiden kategorioissa onkin paljon vaihtelua. Kaiken kaikkiaan vastaajat suhtautuivat videopelien pelaamisen vaikutukseen kyvykkyyksien kehittämisen kannalta keskimäärin myönteisesti. Lisäksi kirjallisuuskatsauksen tulosten ja empiirisen aineiston mukaan peligenren valinta on suoraan yhteydessä siihen, mitä kyvykkyyksiä voidaan kehittää, kun taas muut pelaajien demografiset attribuutit, kuten ikäryhmä ja pelialusta, näyttävät vaikuttavan siihen vain yleisemmällä tasolla.

Avainsanat: videopelit, kyvykkyydet, kyvykkyyksien kehittäminen

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Abbreviation	Definition
2-D/3-D	Two dimensional, three dimensional
4X	Explore, expand, exploit, exterminate
FPS	First-person shooter
MMO	Massively multiplayer online
MOBA	Multiplayer online battle arena
NPC	Non-player character
PC	Personal computer
RPG	Role-playing game
RTS	Real time strategy

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1 Introduction

The video game industry has grown to unbelievable measurements in the last few decades. A simple comparison can give some perspective to the exponential growth: the game industry was globally worth 249.6 billion dollars in 2022, which is more than double the size of the traditionally acknowledged leaders in entertainment, in movies (93.4 billion dollars) and music (31.2 billion dollars), combined (Access Creative, 2023). Video games have become more and more approachable and available as the prevalence of smartphones has reverberated through society in tandem with a cultural change. Video games have been accepted as part of mainstream entertainment, and video game professionals and streamers are some of the most followed public figures in the world. This paradigm shift has led to video games becoming commonplace in our everyday lives. On average, adults between age 24 and 34 spend almost 40 minutes on video games each day and with children consuming more and more of their entertainment via the medium of video games, the time spent on video games on average is projected to be on the rise. (Statista, 2023a.) The generations that have grown during the proliferation of gaming consoles and the console-wars between PlayStation and Xbox are now adults, and entering industries as educated professionals, requiring the necessary skills to be able to cope with a modern career environment. But have video games stunted their development or slowed their growth? The effects of video games have been studied in a dichotomy of benefits and issues, with very few studies positioned with a neutral view on their research. Most of the public attention has been on the negative effects of video games on adolescents and violent behaviours. Very little attention has been paid to the potential mental health benefits of video games in history, but the amount of research has surged to new heights in recent years, following the rise in numbers of video game players. Can the benefits outweigh the detriments?

It is a commonly shared belief that 10,000 hours of anything makes you proficient or an expert in any given activity (Miall, 2013). Can the same be extrapolated to competences you gain as a by-product of, for example, playing video games as a hobby? Many players rack up hundreds of hours of video games per year and the benefits of video games have been a hotly discussed and researched topic in recent years. Studies have hypothesized and proved that video games can have a positive effect on the development of a number of competences, ranging from attention allocation to teamwork. Some of those

competences are integral to succeeding in the modern work environment as well as attaining career development and are highly rated by recruiters and educators alike. So, could video game play as a hobby be evaluated as a positive influence on an applicant's work-related competences, such as teamwork, problem-solving and communication?

But what about the genre? Does the genre have an effect on what competences you can gain from playing the game? Previous research seems to suggest that it could, as your selection of the variety of game genres will engage you in tasks that are starkly different from those in other genres (Dobrowolski et al., 2015). So, in theory, would it be possible to target a set of competences by playing games of a genre that supports that competences development? The most researched games are those that fall into the quite wide category of "action games", as they have also received the highest amount of negative media attention and research to the negative effects that those games can have on the development of adolescents. Other game genres have been studied sporadically, with quite specific research subjects. In addition to different tasks, they may have completely different control schemes and environments. Action games, sports games, shooters, vehicle simulations, strategy games and a number of other genres definitely seem to affect the person playing in a very wide variety of ways. But which ones will help you develop those desired competences?

1.1 Background

One of the main motivators behind this study is the groundbreaking change that video games have gone through in the last decades, becoming "increasingly complex, diverse, realistic and social" in nature (Granic et al., 2014). The rise of serious games has also been exponential in recent decades, as gamified solutions for training and rehabilitation have become increasingly popular. As an example there is a Finnish start-up creating a game called *Meliora* which is being developed as a tool to aid people suffering from depression (YLE, 2022). The effect of serious games on competence development has been studied on a case-by-case basis, but gaming as a hobby and how it influences competence development has not been delved to as deeply.

A vast number of studies have focused on the negative effects of video games as a hobby, and more recently studies on the benefits of games have also entered the stage. But these

studies have been very specific in their research subjects, often focusing on a single competence or a single demographic (genre of game, age of player etc.). There has also been a clear lack of connection between the competences developed by gaming and those desired in a knowledge professional by employers. Most of these competences are widely generalizable to a wide variety of job descriptions as well as sought after by hiring managers. Universities also aim to build and maintain these competences in their graduates, viewing them as essential skills to succeed in a modern career. This study attempts to bridge this gap between the two fields of study as well as bring in an often-overlooked component: the perspective of the gamer themselves.

There is also anecdotal support for this study, as the researcher has utilized video game playing as leverage in multiple job interviews as well as explained developing certain competences with it. One of the clearest beneficiaries of this development is language skills, especially for English as a foreign language. If not for an extensive history with playing video games in English from a young age, even this research would most likely be written in Finnish. But thanks to perceived achieving of confidence and language skills from video games, the research has been completely conducted in English. It naturally leads to the question: can other competences be developed by playing video games as a hobby?

1.2 Research questions and structure

The research questions are split into two: the first research question

- What competences necessary in knowledge work do researchers and video game players perceive to be developed by playing video games as a hobby?

is there to provide the basis for the study and approach a more generalized area. It seeks to provide a list of competences useful in knowledge work that can be gained from playing video games as a hobby. This question is answered in the Prior research and theoretical framework sections and in the Results section when analysing the survey results.

- Are there correlations between developed competences and player demographics?
- Are there correlations between developed competences and genres of video games consumed?

These secondary questions aim to delve a little bit deeper into the correlations between player demographics, gaming platforms, and game genres and their effect on what competences can be developed by playing video games as a hobby. These are mostly discussed in the Results section, with a few competences and genres being matched already in the Prior research and theoretical framework section. With the answer to this question, it might be possible to target specific types of games for developing a specific competence, or for recruiters to gain a better understanding on a candidate's capabilities in some difficult to document competences.

This research paper is structured as follows: first in section 1, we discussed the motivations and the background of the study, and explained the gap in research that this study aims to fill. Next in section 2, the study considers previous research on video games, the benefits of gaming and the competences required in an information worker's career, building a theoretical framework to support the empirical study. Section 3 builds the grounds for how the study was conducted, introducing the methodology and how information for the study was gathered, analysed, and presented. Then in section 4, the results from the survey are discussed and reflected against the theoretical framework. The section is delivered in three parts, first focusing simply on competences, then adding the layer of demographics and finally introducing game genre. Section 5 concludes the paper, spelling out the research findings as well as acknowledging the study's limitations and introduces potential future research directions.

2 Prior Research and Theoretical Framework

2.1 Video games

2.1.1 Gaming platforms

Video game platform demographics are commonly split into three distinct groupings: PC (personal computer), Console/Portable console and Mobile/Tablet. These three groupings are most heavily distinguished by the interface with which the players conduct their gaming activities. On the PC, they commonly use a mouse and keyboard. On the Console/Portable console the player uses a dedicated or built-in controller, usually consisting of directional controls of up-down and left-right or 360 degrees (there can be one or multiple) as well as a set of buttons (usually four in more modern platforms, such as the Xbox X, Y, B and A buttons) as well as triggers on the back of the controller (anything from 2 to 8). Meanwhile on the Mobile/tablet devices, the control interface is in general the touch screen. The borders between these platforms and their control methods are becoming increasingly amorphous, with interconnectivity between control-methods across all these devices.

The PC platform category can be partitioned according to the operating system used, namely Windows, MacOS and Linux, but the differences in actually playing a game are essentially non-existent. Windows is by far the most popular operating system for gamers, and most PC games are built with Windows in mind. (Statista, 2023b.) The Console gaming market has been hotly contested for the last few decades, with Sony's PlayStation (45% market share) system leading the pack against its direct competitor, the Xbox (28% market share). These two platforms are very similar in capabilities and services, and mostly differ in games that are exclusive to either console as well as slight differences in controller layout. Nintendo (28% market share) is the third major player, but it is not quite as directly in competition with the two other major players, as it caters to a more casual audience in many of its titles. (Statista, 2023c; Volckmann, 2024.) The mobile gaming platform has seen exponential growth in the last decades due to the emergence of smartphones and tablets and is dominated by two main players: Google Play and the Apple App Store and their respective operating systems of Android and iOS. There is no distinct difference between these two operating systems when it comes to the core gaming experience.

2.1.2 Game Genres

Due to the organic and emergent appearance of video game genres stemming from a very volatile creative environment, a comprehensive list is very difficult and arduous to maintain. One of the most exhaustive lists exists on Wikipedia, which contains the following genres: action, action-adventure, adventure, puzzle, role-playing, simulation, strategy, sports, and MMO (Wikipedia, 2023). Another quite well curated and concise listing would be the list provided by the Entertainment Software Association on their Essential Facts About the Video Game Industry report, as follows: action, arcade & other, fighting, puzzle, racing & vehicle simulation, RPG & narrative, shooter, skill & chance, simulation, sports, and strategy (ESA, 2022). A distilled version of the listings is shown in the Survey design sub-section and used as the basis of the survey, and includes the following genres: Action & Adventure, Arcade & Other, Fighting, Puzzle & Skill, Racing and Vehicle Simulation, RPG & Narrative, Shooter, Simulation, Sports, and Strategy. There is some distinct overlap between video game genres, so a definitive listing is essentially impossible to create.

Table 1 Game genres with subgenres and examples

Genre	SubGenres	Example
Action & Adventure	Platformers, survival	Super Mario Odyssey, God of War, Legend of Zelda
Arcade & Other	Arcade, rhythm, party	PacMan, Guitar Hero, JackBox
Fighting	2-D fighters, beat'em ups, platform brawlers	Tekken, Super Smash bros
Puzzle & Skill	Physics game, classical, casino	Angry Birds, Tetris, Solitaire
Racing and Vehicle Simulation	Cars, flight, space	Forza, Microsoft Flight Simulator, Kerbal Space Program
RPG & Narrative	MMORPG, roguelite, monster tamer	The Witcher, Hades, Pokémon
Shooter	FPS, vehicle shooter, hero shooter	Counter Strike, World of Tanks, Overwatch
Simulation	city management, life simulation, other management	Cities: Skylines, The Sims, Farmville
Sports	Sports game, sports management game, competitive	NHL, Football Manager, Rocket League
Strategy	4X, RTS, MOBA	Civilization, Starcraft, League of Legends

Beginning with the Action & Adventure genre of games, we will go through a short rundown of the basic components related to each genre. The Action component of the genre encompasses a wide field of game types, but there is a constant attribute that is ever-present in all the Action games: they emphasize physical challenges and speed, often combining dexterity and hand-eye coordination with a test of the player's reaction time. Its pair, the Adventure game genre focuses on exploration and problem-solving. These two are often combined in games, creating the action-adventure genre of games, which is the basis for why these two genres were paired in the survey. Some notable examples of subgenres under Action & Adventure include platformer (where the player must traverse an increasingly difficult progression of level using a variety of movement skills from jumps to dashes) and survival (where the player must explore their surroundings and utilize the resources provided by the environment to survive the games challenges and progress through the story) games. Good examples of games that fit this category would be most Super Mario and Legend of Zelda games, as well as more recent examples of Minecraft and Valheim. (Gray, 2017; Green and Bavelier, 2012; Latham et al., 2013; Vargas-Iglesias, 2020.) For the purposes of this research, the Action & Adventure genre excludes the subgenres that have been mentioned separately in the survey, such as Shooter games and the RTS subgenre under Strategy games.

The Arcade & Other genre is constituted from such subgenres including but not limited to arcade, rhythm and party games. Their complexity is quite low, usually only having a single or few system/s, rule/s, or function/s for the gameplay. They also tend to be repeatable, following the methodology of "infinite games" with no clear ending, and quite predictable. Some widely recognized examples of arcade games would be Tetris, Pong and Pac Man, all stemming from the early times of video games, the limits of technology being one of the main drivers for their simplicity by necessity. (Danawan et al., 2020; Gao et al., 2022.) The second participant of the pair is the Other genre, which is another broad term holding similarity to Arcade games in some ways. The examples used in the survey are rhythm and party games, which share the same nature of being endlessly repeatable and not suffering from extraneous complexity. Examples of such games include Guitar Hero and Beat Saber for the rhythm games and Jackbox, Mario Party and Buzz for party games.

Our next genre of games is considerably more well defined than the previous two: Fighting games are exactly what they sound like, the main purpose is to use a character's physical abilities to beat their opponents into submission. The Fighting genre includes such subgenres as beat'em ups (where the player goes through a gauntlet of enemies consisting of simple grunts and more difficult bosses, such as the SEGA produced Turtles games), platform brawlers (where multiple characters fight to throw each other off a shared platform, like the Super Smash Bros' series), 2-D fighters (where characters can only move up and down and side to side in a limited arena, like the Tekken series), and 3-D fighters (where the fighting is not limited to side-scrolling, but allows for movement in a three dimensional environment, such as Sifu). The games can range from one-vs-one to one-vs-many and can contain any number of martial arts, and rely heavily on the mechanics of reacting to and avoiding attacks as well as countering them. (Johnson and Woodcock, 2017; Lorentz, 2016; Mattiassi, 2019.)

While there are some staples of the genres, the Puzzle & Skill genre package can still cover a wide variety of different types of games. The subgenres that were provided as examples were physics, classical, and casino games. Game examples for the subgenres were identified as Angry Birds for physics (where the player has to shoot a bird from a slingshot, the bird following a parabolic arc, to hit their target. Velocity and angle need to be considered to hit the target effectively), Tetris for classical (blocks of varying shapes fall from the top of the screen to a limited space, and the player has to rotate and position them so as to fill complete rows to make more space. Other games such as sudoku, crosswords and jigsaw puzzles also fall within this subgenre.) and Solitaire for casino (solitaire and other card games fall within this category). Depending on the type of puzzle game, there is a clear loop of trial and error as well as strategizing and planning ahead. Puzzle & Skill games are usually cognitively challenging, distinguishing them from the otherwise quite similar Arcade & Other genre. (Nelson and Strachan, 2009; Oei and Patterson, 2014; Pusey et al., 2022.)

Racing & Vehicle simulation can be split into a few subgenres. Car racers are by far the most numerous and popular, with examples ranging from arcade-ish Mario Kart to realistic racing simulators such as Forza Motorsport. Beyond that, vehicle simulation can be anything from airplanes (Microsoft Flight Simulator) to spaceships (Elite: Dangerous) and even novel, non-realistic vehicles (such as the pod-racers in Wipeout: Fusion). The basic gist of these genres is to control a vehicle on either a set track or a free roam space,

and either to complete races or challenges, or to provide the player with an experience similar to controlling such a vehicle in reality. Some racing games can be very close to arcade games, but have been included in this genre for the similarity of their contents and requirements from the player. (Gerdes, 2022; Korteling et al., 2017; Possani-Espinosa et al., 2017; Stollberg and Lange, 2020.)

Moving on to our next genre grouping, RPG & Narrative, we come to another broader grouping of genres and games. In both the RPG (Role-playing games) and Narrative games, the gameplay is focused on a fictional world with a consistent story offering branching paths that become available according to the player's decisions during pivotal points on their journey. Role-playing games can vary widely in the genre as well, from Massively Multiplayer Online Role-playing Games like World of Warcraft or EVE online, where thousands of players create their own characters and play the game together or against each other assuming the capabilities and attributes of their character, to monster tamers such as Pokémon, where you play a character that is trying to collect and train the most powerful team of Pokémon to fulfill one of your goals. The two things central to all RPG & Narrative games are the story and the character, and how these two intertwine either according to player decisions or a developer-set path. The games are also generally defined by complex interaction with non-player characters (NPCs), often allowing multiple choices in conversations and story-altering decisions for the player. (Arenas et al., 2022; Karamian, 2018; Saraswati et al., 2022; Zagal, 2018.)

The Shooter genre, on the other hand, is relatively well defined. The focus of these games is the discharge of a weapon, or shooting, to eliminate any number, shape or form of opponents. No matter what the viewpoint (First-person, seeing what your character/avatar sees; third-person, seeing over your character/avatar's shoulder/behind their back; top-down, viewing your character/avatar and the surrounding area from a bird's eye view) the focus is generally on utilizing any number of weapons to defeat your opponents or solving a puzzle. The most notable and distinct subgenres of the Shooter genre can be listed as follows: FPS, or first-person shooters, with examples such as Call of Duty or Battlefield, vehicle shooters such as World of Tanks (where the player controls a tank to battle other tanks), and hero shooters such as Overwatch or Team Fortress 2 (in which the players character has some special hero-like abilities in addition to mere gunplay). Most Shooter

games are violent, but there are also non-violent options fringing on Puzzle games, such as Portal. (Colzato et al., 2013; Holm, 2023; Mun, 2023.)

The Simulation genre contains subgenres that gravitate more towards management: City management, life simulation, and other management. City management has a few prominent examples in SimCity and Cities: Skylines, which both revolve around building up your community from a village up to a bustling city, fulfilling all your citizens' needs. Life simulation on the other hand moves from the macro to the micro, usually controlling a single character or up to a household of characters through their lives, such as The Sims or Second Life. Other management examples can be anything from Two Point Hospital, a hospital management game, to Rollercoaster Tycoon, a game where the player builds and manages an amusement park. The core ethos in these genres is the collection and management of resources to improve your environment so as to enable more resources and more development. (Arnold et al., 2019; Jolly et al., 2023; Kim and Shin, 2016; Lin and Lin, 2017; Tanes and Cemalcilar, 2010.)

The Sports genre has been limited to exclude racing games, and now includes for example the following subgenres: traditional sports game, sports management and competitive games. They are usually representations of a real or fictitious sport. Traditional sports games contain household names in video gaming such as EA Sports FC (Previously known as FIFA) and the NHL series of games. They mostly mimic real-life sports activities, where the player controls either a single player or a team. A great example of a sports management game would be the Football Manager series, where the player takes a step back from controlling players to being the manager on the side of the pitch and handling administrative tasks outside of matches. The competitive subgenre includes other, non-real life sports, such as Rocket League, where players play as toy cars in an enclosed arena, attempting to score goals in what resembles football with vehicles. The core goal in competitive games is to rise in rankings to reach as high as you can, playing against other players. (Consalvo et al., 2013; Crawford, 2015; Crawford et al., 2018.)

One of the most storied genres of games is the Strategy genre with its plethora of subgenres, ranging from real-time strategy (RTS) to 4X, tactics games to an RTS-spinoff known as the MOBA (Multiplayer Online Battle Arena). In general strategy games can be split into two groups in real-time and turn-based games, but there are also some hybrids to this dichotomy. Well-known examples of real-time strategy include games such as

Starcraft, the progenitor of esports, as well as the League of Legends, the current leader in esports. (Novak et al., 2020.) Some of the best-known turn-based strategy games are the Civilization series and Heroes of Might and Magic. The main common denominator in games belonging to the Strategy genre is that the player usually controls more characters than one. The games are often focused around battles or a quest for domination through other means than warfare, and reward thinking ahead as well as making strategic decisions and planning to guide the player's actions. (Basak et al., 2008; Feng, 2024; He et al., 2024; Lewandowska et al., 2022.)

2.2 Benefits of gaming

The same mechanics that are found to nurture competences in children's playful experiences seem to be found in games as well, providing a way to grow cognitive, motivational, emotional and social competences in players (Granic et al., 2014). It is clear that most transferrable competences attainable from gaming as a hobby are what are known as personal attributes. There are exceptions to the rule, in the form of educational games or gamified learning, such as Ubisoft's coding learning game Rabbids Coding, released in September 2020. It is a game based on the original Rabbids IP that teaches a player the basics of coding. There are other more specific games for learning a specified task and even gamified learning platforms, but those exceed this research paper's scope of competences attained from gaming with the goal of receiving entertainment.

During the literature review, competences were selected from literature according to their relevance to two categories: the competences that have been mentioned in studies on the benefits of playing video games, and the competences that are present in information system related university level curricula and/or those represented in the research of what knowledge work competences are relevant and desirable in modern careers. All selected competence was corroborated by multiple research articles, to avoid any unsupported or untested competences to be included. This search pattern also provided some skills that were not applicable to the research, such as context specific competences, which were especially prevalent in research about what companies and hiring managers value in a prospective employee. Many of the resulting competences were further combined according to context to create a listing that was comprehensive, but not excessively

extensive. An example of this would be grouping computer literacy and digital nativity under the Transferable IT skills competence. These are three terms that describe the same skills in the context of this research, and they and other examples are shown in the competence tables in the following sections. These steps were taken to keep the survey to an approachable level of granularity and the required previous knowledge to a respondent-friendly level. For the same reason, some competences that were unnecessarily broad and vague, like “social skills”, or too specific, such as “visual processing”, were excluded or folded into the current list of competences. The competences and their components are discussed thoroughly in this and the following section, as well as providing a context for their presence in both gaming and career environments.

2.2.1 Cognitive competences

Table 2 Cognitive competences potentially developed by video games desirable in a knowledge work professional (Granic et al., 2014; Jones et al., 2018)

Subcategory	Competence	Terms in literature
Cognitive	Focus	Flow, attention allocation
	Learning	Ability to learn, learning to learn
	Adaptability	Flexibility
	Problem-solving	Analytical thinking, critical thinking, thinking skills
	Attention to detail	
	Creativity	
	Transferable IT skills	Computer literacy, digital nativity
	Multitasking	Task-switching
	Strategic	Planning

Cognitive competences were by far the most mentioned and delved into in previous literature, with comfortably the most research being focused on action video games and shooter games and their effect on attention allocation and cognitive control. The first competence in the survey was Focus, or “the ability to allocate your attention to a single task at hand and reach a flow state”. The Focus competence was distilled from a number of competences mentioned in previous literature. Attention allocation, focus, concentration, and mental flow were present in most articles that didn’t focus on just a single specific competence in their research. Focus and attention allocation were

especially prevalent in the research that was based on action video games and their players. (Chisholm and Kingstone, 2015; Lu et al., 2022; Maclin et al., 2011.)

The learning competence was built as a union from a number of competences mentioned in previous literature: learning-to-learn, ability to learn, memorization, memory and neural processing. It is separated from Learning from failure by the fact that learning does not necessarily require failure. Learning-to-learn as a competence is imperative in picking up any complex video game or new system in a game more quickly and accurately. According to previous research, video game players utilize a wider variety of learning strategies compared to control groups. (Scolari and Contreras-Espinosa, 2019; Zhang et al., 2009.) Action video games were recognized once again as a great source for this competences development (Bavelier et al., 2012; Ru-Yuan et al., 2021).

Cognitive control, split-second decision-making, dealing with unpredictability and flexibility form the Adaptability competence. Video game players are often thrown to a variety of different situations to which they must adapt to in order to complete their task. Cognitive control especially has been widely studied and shown to receive benefits from video game consumption, as it requires the intentional selection of thoughts and behaviours that fit the current task at hand. (Anguera et al., 2013; Campbell et al., 2023.)

Problem-solving in video games has had a variety of contextual competences attached to it in previous research: information finding, analytical skills, critical thinking and problem-solving itself. Depending on the style and complexity of the game, these competences are, more or less, utilized in all games. The most obvious examples are puzzle games, where the whole game revolves around a problem to be solved, the puzzle. Studies have shown that video game play can develop problem-solving styles and preferences as well as connected expertise in video games to expertise in generalizable problem-solving. (Adachi and Willoughby, 2013; Hamlen, 2018; Monjelat et al., 2012.)

A high attention to detail is a key performance indicator in many modern games. They offer a vast amount of visual data from which the player needs to be able to select the most important information as quickly as possible. Especially action video games have been shown to develop sensory perception and visual processing capabilities in players. (Bailey and West, 2013; Cain et al., 2012; Riesenhuber, 2004.)

Creativity as a competence is quite nebulous, as it can be connected to artistic creativity, creative problem-solving and a number of other dimensions. Huertas-Abril and Muszyńska (2023) found that playing a video game affected the creative writing skills of English-as-a-foreign-language students. Meanwhile, players of a variety of video games were found to have developed their creativity in problem-solving, albeit there were some caveats (Blanco-Herrera et al., 2019; Shute and Rahimi, 2021).

Transferable IT skills, or “digital nativity”/computer literacy, is a contextual competence that has not been researched extensively in connection to video games. It is not a competence that is directly observable, but rather a set of expectations and experiences on how a software or system should work. This “confidence with computers” as well as a general interest in technology has been reported in video game players. (Scolari and Contreras-Espinosa, 2019; Sevin and Decamp, 2016.)

Multitasking is necessary in many modern games. You have to be able to juggle tasks and run them simultaneously, making sure that none are left unfulfilled. Multitasking is intrinsic to complex videogames and has thus been studied quite extensively. Especially action games have been connected to the development of a player’s multitasking competence (Cardoso-Leite et al., 2015; Chiappe et al., 2013; Hambrick et al., 2010). It has been shown that a person’s multitasking ability is reduced linearly through the adult stages of life, but gaming has been found to help improve multitasking and cognitive control abilities even at an advanced age. (Anguera et al., 2013).

A lot of video games require the player to think further than just the next immediate move. Strategic thinking helps the player to assess situations and make a plan to guide them in their desired direction. This is especially prevalent in games with long term goals and continuity, where decisions may matter for the rest of the game. Video game players with expertise were found to think ahead more often, while less playing compatriots relied more on trial-and-error tactics (Hong and Liu, 2003) as well as the more experienced players exhibiting flexibility in their thinking and being able to consider a number of solutions at once. (Basak et al., 2008; Science Teacher, 2013.)

2.2.2 Motivational and Emotional competences

Table 3 Motivational and Emotional competences potentially developed by video games desirable in a knowledge work professional (Granic et al., 2014; Jones et al., 2018)

Subcategory	Competence	Terms in literature
Motivational and Emotional	Self-confidence	Confidence,
	Emotion regulation	Behavioral skills, interpersonal, professionalism
	Learning from failure	
	Motivation	Attitude
	Persistence/perseverance	Continuous effortful engagement
	Withstanding pressure	

Self-confidence in videogames has a few different aspects: a player should be willing to take some risks to advance past difficult obstacles, and after surpassing those hurdles, they should be allowed to celebrate their success. This engages a positive feedback-loop, where celebrating success gives more confidence to take risks, which allow the player to achieve more successes and so on. This builds the player's confidence in their own capabilities, developing the generalizable competence. (Horowitz, 2019; Sevin and Decamp, 2016.)

Playing video games can be an emotional rollercoaster. Be it the emotion-evoking stories in narrative games or losing in a competitive game, controlling one's emotions can have benefits for the player. Emotion regulation is an essential competence, and although emotion regulation issues in players with a problematic relationship with video games has been studied extensively (Gibbons and Bouldin, 2019), there are also studies that support the positive development of the competence via video games (Hemenover and Bowman, 2018; Pallavicini and Bouchard, 2019).

Learning from failure is an important skill in any video game. It edges on persistence, but allows for the player to, instead of trying the same thing over and over until success is reached, take a step back, analyse what went wrong and then make the necessary adjustments to succeed in the task. This attribute of games has been widely leveraged by serious games, and the competence developed by it has been recognized in experienced video game players. (Anderson et al., 2018; Latham et al., 2013; Whitton, 2018.)

Gamers have been reported to have a very high motivation to find a new challenge to conquer. They are also reportedly able to hold a good control on finding what things motivate themselves to continue a task in a game. Both intrinsic and extrinsic motivations

were reported as important factors in how video game players motivate themselves to continue with a task. (Cianfrone et al., 2011; Reid, 2012; Tavinor, 2017.)

Persistence/perseverance is a competence that is essentially required to complete any commercial video game. The player is taught to try again when they fail, and failure is expected and sometimes even encouraged as a part of the gameplay-loop. Persistence in the face of failure and continuous effortful engagement have been reported as key personality traits for experienced video game players, especially when there is a clearly defined goal to strive for. (Neys et al., 2014; Velez et al., 2022; Ventura et al., 2013.)

Many video games have the player operate in a high-pressure environment. Whether it is in the form of a time limit, threat from enemies or competition with opponents, pressure and the capacity of the player to withstand it is at the core of many video games. Withstanding pressure has been revealed as a competence that can be developed by video games, as video games put the player in such situations often, increasing their resilience in such situations. (Gray, 2017; Holm, 2023; Stollberg and Lange, 2020.)

2.2.3 Social competences

Table 4 Social competences potentially developed by video games desirable in a knowledge work professional (Föll et al., 2018; Granic et al., 2014)

Subcategory	Competence	Terms in literature
Social	Teamwork	Collaboration, cooperation
	Communication	
	Empathy	Prosocial behavior
	Dependability	Ethics, honesty, responsibility
	Language skills	
	Leadership	
	Negotiation	

Teamwork, including collaboration and cooperation, has become a staple of a vast variety of video games. Whether it is teamwork with NPCs, other players that you know or other players that you do not know, a significant percentage of games nowadays feature some form of teamwork. It is often required to reach the most prestigious goals in any multiplayer video game. A good example is the World First race in beating the most recent dungeon on its highest difficulty in World of Warcraft, where hundreds of teams

of 20 people and support race to be the first one to fell the game's most difficult challenges. Farah et al. (2023) found that simulation games were especially effective in developing the coordination skills of video game players. Feelings of cohesion and increased cooperation were also among the competences that previous research reported as being developed by video games, with trust being mentioned as a key driver for their development (Greitemeyer, 2013a; Lee and Chang, 2013).

When discussing under pressure or on a short timer, effective and concise communication is key. Communication is a skill that in regard to video games, has two facets: The content reliant task-oriented side, where players develop more accurate and quick communication skills as they gain experience, as well as the more common socioemotional side, where players with more experience also communicated more positively and expressively. Video games of different varieties also have clear differences in what form of communication they facilitate and what communication skills they develop, with the most obvious difference being between oral and written communication competences. (Horowitz, 2019; Peña and Hancock, 2006; Salomatova, 2023.)

Empathy is a competence that is often viewed in a negative light when it comes to video games: most often news headlines and even research focus on the desensitizing nature of violent video games and their effect on the players empathetic nature. However, studies focusing on video games with prosocial content have provided evidence to support the hypothesis that such video games can have a positive effect on the player empathetic skills, such as reducing schadenfreude and increasing connection to historic events and the people that experienced them. (Gilbert, 2019; Greitemeyer et al., 2010; Kral et al., 2018.)

Dependability is a competence that was mentioned via a multitude of different names in previous literature about competence attainable in gaming: ethics, trust, work ethic, responsibility, honesty, integrity are some examples. Ethics was found to be teachable via video games (Schrier, 2015) and playing video games cooperatively in a team was found to develop trust between those players. (Greitemeyer et al., 2012; Zheng et al., 2021.)

Language skills gained from video games is a competence specific to those players that either do not have English as their primary language and/or do not have video games available localized to their primary language. Many of the more popular video games are

localized to a multitude of languages, such as League of Legends that is available in a grand total of 16 languages (Riot Games, 2024). But for players from those regions using languages that big games are not localized to, players of games that are not localized at all or players that voluntarily play video games in a foreign language, video games can be an excellent source for deepening your knowledge of a language. There is a threshold of language skills that some games require to understand, but in most cases it is not prohibitive. Horowitz (2019) found that MMORPG's offered a secure space for players to practice their language skills and gain confidence to use the language by exercising in a virtual space that feels safe. One of the biggest benefits of playing video games in English for English-as-a-foreign-language learners is also the significant increase in breadth of vocabulary and quality of pronunciation (Alrajhi, 2020; Horowitz, 2019; Junttila et al., 2022).

Leadership is a competence that has been studied relatively little in connection to video games, but there are clear indications that Leadership as a competence can be improved by playing video games. Potard et al. (2020) found that sport video game players were more likely to hold and aspire to hold leadership positions and self-evaluated themselves to have better leadership skills than average. Some studies reported that video games are useful as didactic tools for leadership development, where the role that the player selected in the game had a clear effect on the type of leadership style they exhibited (Nuangjumnong, 2016). Thus, a specific role or video game genre could be selected to achieve development in a desired leadership style. These roles could vary from leading a raid in a MMORPG into being a supporting character in a MOBA game, both with very different requirements and interactions. In general, video games have been connected to leadership competence development and that these competences are translatable to an offline environment as well. (Franco and DeLuca, 2019; Lee et al., 2018; Schrier et al., 2023.)

Negotiation in video-games can vary from the more mundane like the trading of resources in many multiplayer games, to the more substantial, such as forming coalitions between alliances of thousands of players in EVE Online (Milik, 2017). Such skills are used in an attempt to find an agreement that is beneficial to both parties. Chen (2018) found that players negotiating in the Second Life simulation game developed their negotiation skills, allowing them to handle more complex negotiations and to build a routine for bartering and coming to a common agreement.

2.3 Competences of an IS professional

The competences found to be attainable from video games translate excellently to the competences that are desired from a knowledge worker, with most of them present in a lot of the research focusing on what companies are looking for in a candidate as well as what universities aim for their graduates to be capable of.

In a professional environment, personal attributes seem to be valued higher compared to technical know-how when rated by information systems managers. Especially with recent advancements in conversational AI, such as ChatGPT, which can produce most if not all necessary lines of code for a piece of software by using the right prompt, the amount of necessary contextual competences that a IS professional needs seems to be on the downturn. With the more technical skill requirements becoming easier and easier to fulfil with the help of software and low-code/no-code platforms, a professional's personal attributes become ever more apparent. Branchet and Sanseau (2017) find that for IT suppliers, personal attributes are considered as critical competences moving forward, while technical skills are moved to the peripheral. Likewise Jones et al. (2018) found that for entry level positions, managers emphasize personal attributes well above any context specific knowledge. In their findings the field the company is operating in, its size or other similar attributes have no bearing on this mismatch in the weight of personal attributes versus technical know-how. Especially valuable were found to be the skills of communication, motivation, team skills, problem-solving, critical thinking and creativity. (Föll et al., 2018; Jones et al., 2018; Omar et al., 2014.)

Jones et al. (2018) also included the willingness and ability to learn as the most valued intrapersonal/interpersonal competence, as well as it being the overall top scorer among all competences, including context specific technical knowledge, in their research. The ability to learn new tasks and processes is not only necessary at the beginning of employment as continuous development has become a carrying theme in modern, ever lengthening careers. It borders on Adaptability, another core competence for a knowledge-worker in the 21st century environment. Things are changing faster than ever before, and employees are expected to adapt to any situation that arises, being able to perform their tasks to a satisfying degree in a great variety of circumstances. (Stevens et al., 2011; Topi et al., 2017.) In connection to both Learning and Adaptability,

Transferable IT skills or computer literacy is an essential competence in lowering the threshold for adopting new software and hardware. The faster an employee is able to adopt new technology, the faster they'll be able to utilize it in a productive manner. (Branchet and Sanseau, 2017.)

Being able to allocate your attention to and focus on the correct and current task is imperative at work where prioritization is a highly required competence (Debbie Wang et al., 2007). With the number of potential stimuli associated with modern open concept office floors and personal smart-devices, reaching a flow state can be very difficult. Thus the ability for an employee to be able to reach that state of focus is very valuable in many careers (Nielsen and Cleal, 2010).

Multitasking is a competence that is viewed from two very different perspectives in work life: first, as a sign of efficiency and resource management, and second, as a sign of distraction or disintegration. Newer research found multitasking to be an imperative requirement for knowledge workers in the current fast-paced work environment. (Iqbal et al., 2023.) Planning and Strategic thinking helps an employee to allocate resources in the long term and to avoid being overwhelmed down the line. It also allows them to take a step back and view projects and their work more holistically, thinking about long term solutions instead of band-aid fixes. (Brooks et al., 2018.)

In a high-pressure work environment, working with a multitude of different personalities, emotion regulation stands out as an important competence for coping with any situation. Previous literature has found that professionals need emotion regulation strategies to be able to handle circumstances outside of their control and to be able to maintain a professional working environment. (Gagnon and Monties, 2023; van Hooft and Kreemers, 2022.) Brooks et al. (2018) found that over 75% of job postings in the field of information security treated team and teamwork skills as a requirement and over 50% included communication as a necessary competence. In regards to communication as a skill, Föll et al. (2018) include language skills in their listing as a separately mentioned competence.

Psychological safety has become a leading theme in successful organizations. It allows employees to be able to bring forward and learn from their failures, instead of feeling shame and potentially hiding those issues. An employee that has the competence of learning from their failures is also less likely to repeat those mistakes, having reflected

on what caused the failure before. (Cannon and Edmondson, 2005; Carmeli and Gittell, 2009.) Another competence directly linked with psychological safety in an organization is self-confidence. If an employee does not feel confident, they may not suggest new ideas or point out possible issues in established or proposed processes. Creative self-confidence is also a key driver in innovations at work. (Dar et al., 2022; Ma et al., 2023; Sudarnoto, 2023.) One more key component of psychological safety is Dependability, and it is also a competence that is highly valued in a knowledge worker. It is present both in university curriculums as well as job adverts, as suggested by previous research (Jones et al., 2018; Omar et al., 2014; Topi et al., 2017).

Table 5 Competences attainable from video games and desirable in a knowledge work professional (Föll et al., 2018; Granic et al., 2014; Jones et al., 2018)

Subcategory	Competence	Terms in literature
Cognitive	Focus	Flow, attention allocation
	Learning	Ability to learn, learning to learn
	Adaptability	Flexibility
	Problem-solving	Analytical thinking, critical thinking, thinking skills
	Attention to detail	
	Creativity	
	Transferable IT skills	Computer literacy, digital nativity
	Multitasking	Task-switching
	Strategic	Planning
Motivational and Emotional	Self-confidence	Confidence,
	Emotion regulation	Behavioral skills, interpersonal, professionalism
	Learning from failure	
	Motivation	Attitude
	Persistence/perseverance	
	Withstanding pressure	
Social	Teamwork	Collaboration, cooperation
	Communication	
	Empathy	Prosocial behavior
	Dependability	Ethics, honesty, responsibility
	Language skills	
	Leadership	
	Negotiation	

3 Study design and methodology

3.1 Methodology

The methodology adopted for the execution of this thesis was a hybrid of qualitative and quantitative research methodologies. While the data was gathered with a quantitative method in a Likert-scale survey, the data set collected as such is better evaluated with qualitative methods. Thus, it was chosen that a descriptive survey would fit the subject and solution of the research questions the best. It's main prerogative is "to describe a particular phenomenon" (Williamson and Johanson, 2018) which in this case is the perception of received skills from gaming as a hobby. The survey's goal is to bring the respondents' perceptions into a numerical form that can be evaluated and reflected to previous literature surrounding the subject, as well as enable the comparison of the numerous demographics and perceptions of different competences to each other. As this research subject has not been studied before, it was natural to begin the study with a look into the current circumstance of the phenomenon.

Another reason for choosing to do a descriptive survey via an online dissemination was the relative ease of implementation and ability to gather empirical data in a quick and convenient manner from the targeted research demographic (knowledge workers with gaming as a hobby). In juxtaposition to the convenience allowed by an online descriptive survey, the researcher took extra steps to avoid imprinting their own expectations and prejudices on to the survey itself and the analysing of the empirical data.

After the empirical data was collected, it was evaluated with the tools of thematic analysis and correlation analysis to search for clear connections between the varied demographics of age group, time spent playing video games, gaming platform and game genre, and perceived developed competences. These methods are further discussed in chapter 3.4 Analysis process.

3.2 Survey design

During the literature review, there arose from the data a natural classification of competences or benefits of video games. They can be roughly grouped into four distinct categories: cognitive skills, motivational skills, emotional skills and social skills (Granic et al., 2014).

These four subcategories have been defined in table 3 below, with examples included. The subcategories were chosen due to their validity in both academic and professional contexts as well as their presence in literature on the benefits of gaming. Cognitive skills enhance professionals' abilities to analyse complex situations, make informed decisions, and navigate dynamic work environments. These skills are instrumental in fostering innovation, effective communication, and leadership, contributing to overall workplace success and are developed and refined through various experiences, education, and (what is most connected to video games) exposure to different cognitive challenges. Motivational skills empower individuals to initiate and sustain personal drive, navigate challenges, and achieve objectives, contributing to perseverance, adaptability, and positive engagement. Emotional skills enable individuals to navigate their own emotions effectively, fostering emotional intelligence and enhancing overall emotional and mental health. Social skills equip individuals to navigate diverse social situations and build positive relationships. These skills are essential for successful teamwork, conflict resolution, and overall interpersonal effectiveness.

Table 6 Competence subcategory definitions that were synthesized from the literature review and thesauri (Granic et al., 2014; Merriam-Webster, 2024)

Skill	Definition	Example
Cognitive	Cognitive skills are the mental processes and abilities connected to thinking, learning and problem-solving, used to process information, perform tasks, and process information.	attention allocation
Motivational	Motivational skills are a person's ability to inspire and encourage themselves to take action, achieve goals, and overcome obstacles.	resilience in the face of failure
Emotional	Emotional skills are the set of abilities related to recognizing, understanding, managing, and effectively using emotions in oneself, enabling well-being and resilience.	mood management
Social	Social skills are the behaviours, communication abilities, and interpersonal competencies that allow individuals to effectively navigate social situations and collaborate with others successfully.	prosocial behaviour

3.3 Information gathering

3.3.1 Survey

As the aim of the study is to not only research what career supporting competences do gamers perceive are garnered or enhanced by playing video games, but also to find out if

demographics and certain types of games played affect the results, demographical data is collected extensively. Participants were asked to supply their age and time spent playing weekly as general data. Age groups were split to groups of 18-22, 22-28, 28-35, 35-45 and 45+. The groups were divided as such according to the following logic: 18-22 as young adults and early student life, 22-28 as late studies and early career, 28-35 as prime career years, 35-45 as family years (Knowledge workers are usually highly educated, and for the highly educated in Finland, the first child is had on average at age 32 (HS, 2022)) and 45+ as late adulthood. The time spent playing video games on average per week was grouped as follows: 0-2 hours (casual, one hour per weekend day), 2-7 hours (semi-casual, up to an hour a day), 7-14 hours (active, few hours per day) and 14+ hours (frequent, significant portion of free time spent on video games). This data was gathered to allow the research to potentially distinguish the difference in valuing competences gained from gaming between gamers of different age groups and varied gaming activity levels.

After these questions, the survey moved towards more gaming platform and game genre specific data. The demographics that are apparent in video game players go deeper than just gender and age group. There is a technological demographic, that arises from what platform you consume your games on. This can be affected by available resources and the effects of your social network, as gamers might gravitate towards platforms where their friends will be playing as well. Additionally, certain games have been effectively profiled onto a specific platform, such as sports games like EA Sports FC (previously known as FIFA) and NHL onto consoles. There are also games that are developed exclusively for a certain platform, such as the Halo-series onto Microsoft's Xbox platform. In recent years, the barriers of platform specificity have been broken down bit by bit, as cross-platform gaming has been steadily on the rise. At the same time, platform exclusivity has moved from hardware to software, with services such as the Epic Games Store and Microsoft's PC Game Pass making deals with developers to release their games first exclusively on their store, releasing them on other marketplaces later. Accordingly, the available gaming platforms were identified as: PC (personal computer), console (including handheld consoles), and mobile (including tablet).

The genres of games were sourced from the literature review as well as the 2022 Essential Facts of the Video Game Industry (ESA, 2022). Some genres have been combined, as they are functionally very close to each other, and their benefits were very similar

according to the literature review. An example of this would be FPS (First Person Shooters) and Third Person Shooters being grouped together in the “Shooter” genre and the combination of Puzzle and Skill & Chance genres into a singular Puzzle & Skill genre. These combinations were made to try to distil relevant data and to keep the survey from ballooning unnecessarily. The genres that resulted were Action & Adventure, Arcade & Other, Fighting, Puzzle & Skill, Racing & Vehicle Simulation, RPG & Narrative, Shooter, Simulation, Sports, and Strategy. Each genre was followed in the survey by a list of subgenres as well as examples of games in the genre to help the responder to distinguish between the otherwise quite broad and amorphous genres, as is shown in the table below. To create a distinction between simulation genres, they were split in this research to Racing & Vehicle simulation as well as the Simulation genre.

The varied benefits of gaming were sourced from the literature review and were discussed at depth in the previous section (2.2) of the study. These were further curated to combine those that were essentially substitutes of the same attribute or could be grouped under another competence, such as attention allocation and focus. The competences included in the survey were grouped under the subcategories of Cognitive, Emotional and Motivational, and Social as shown in the next table. Many of the competences were combined and refined into terms that would be easy to understand for the person providing a response to the survey.

Table 7 Competences with definitions, grouped under subcategories (Merriam-Webster, 2024; Oxford English Dictionary, 2024)

Subcategory	Competence	Definition
Cognitive	Focus	the ability to allocate your attention effectively to the task at hand
	Learning	the ability to acquire knowledge through study, experience or being taught
	Adaptability	the ability to adjust to new conditions
	Problem-solving	the ability to find information, analyze it and utilize critical thinking to decide how to solve complex issues
	Attention to detail	the ability to process detailed information effectively and consistently
	Creativity	the ability to produce or use original and unusual ideas
	Transferable IT skills	the ability to quickly adopt and use new software
	Multitasking	the ability to perform more than one task at the same time
	Strategic	the ability to analyze and understand the big picture, anticipate potential challenges and opportunities, and make informed decisions according to long-term goals
Motivational and Emotional	Self-confidence	the feeling of trust in one's abilities, qualities, and judgement.
	Emotion regulation	the ability to modulate an emotion or set of emotions
	Learning from failure	the ability to gain accurate and useful insights from failures and modify future behaviors
	Motivation	the internal state that helps one initiate, continue, or terminate a behavior
	Persistence/perseverance	continued effort to do or achieve something despite difficulties, failure, or opposition
	Withstanding pressure	the ability to continue doing a task effectively despite opposition or hindrance
Social	Teamwork	the ability to work effectively and efficiently with a group
	Communication	the ability to concisely and effectively exchanging information via a chosen medium
	Empathy	the ability to understand and share the feelings of another
	Dependability	the ability to be trustworthy and reliable
	Language skills	the ability to communicate in a specific language
	Leadership	the ability to lead a group to reach a common goal
	Negotiation	the ability to barter an outcome between two sides with different aims or intentions

A unipolar Likert scale was selected for the survey for its simplicity and the vague nature of perceived competence development. The survey does not aim to quantify whether a competence was developed, but rather measure how the video game player perceives that video gaming as a hobby has affected a certain competence. Thus, the unipolar Likert scale allows for a simple measurement of effects by video gaming as a hobby on a specific competence. The steps on the unipolar Likert-scale were as follows: “None” for no perceived effect, “Unsure” for uncertainty on the effect, “Some” for a noticeable, but not significant effect, and “Significant” for a significant effect on the development of a specified competence. These responses were all given a numerical value of 1, 2, 3, and 4 accordingly, for ease of handling and analysing the data.

3.3.2 Survey respondent demographical information

The demographical data that was collected on the respondents was limited to a single conventional demographical question, the age group of the respondent, and three “gaming demographic”-questions, consisting of time spent playing video games weekly, platforms on which games are played and genres of games played.

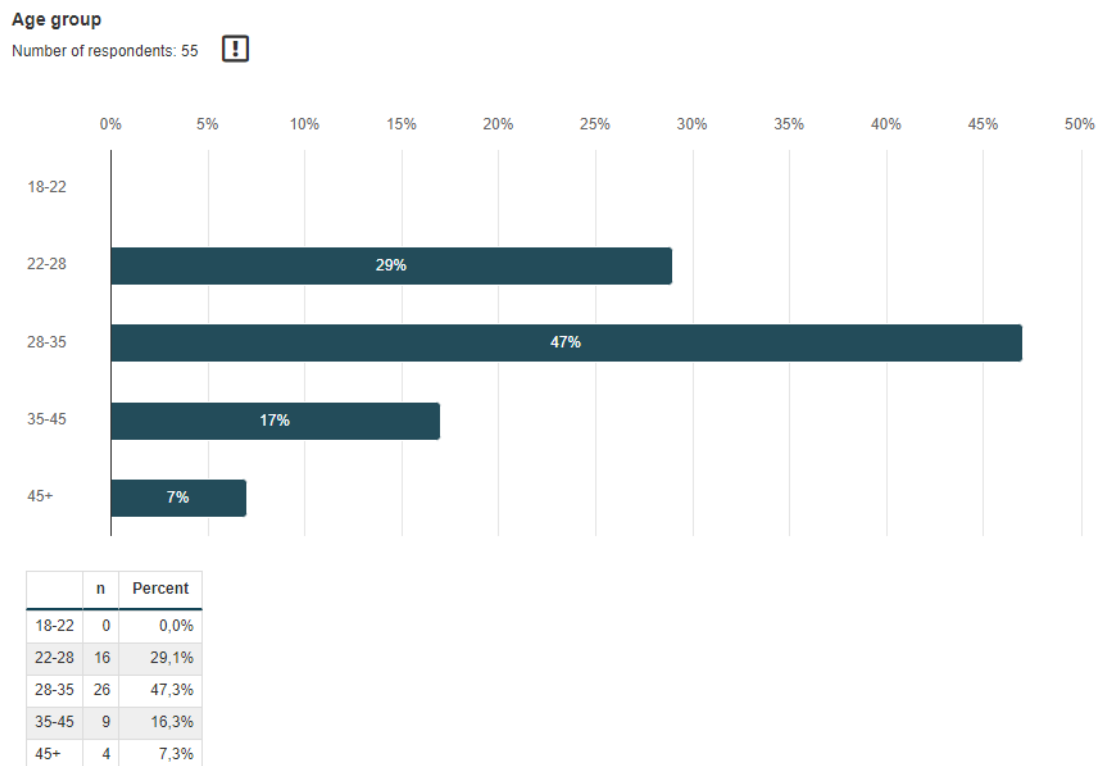
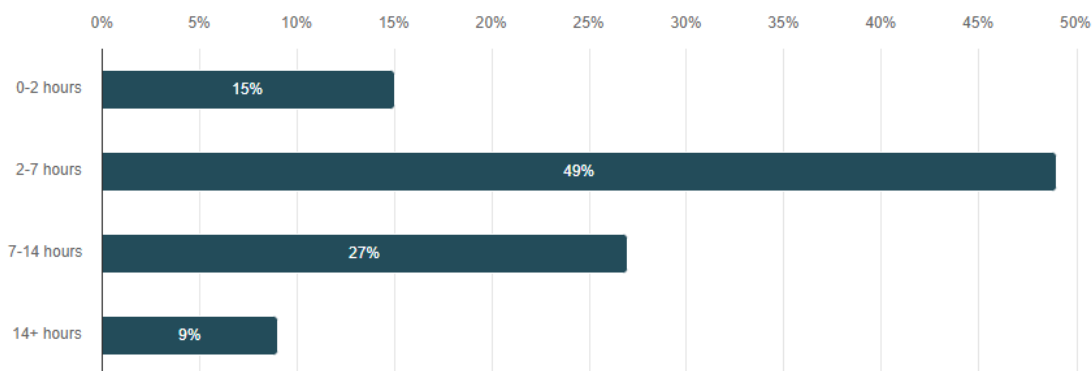


Figure 1 Age distribution of respondents

Out of the respondents, the age groups were split as follows: no players in the 18-22 age group, 16 in the 22-28 group, 26 in the 28-35 group, 9 in the 35-45 group and 4 in the 45+ group. The prevalence of the 28-35 and 22-28 groups and lack of participants in the 18-22 group can partly be explained by the demographics in the researcher’s social circle, where most people fall into the 25-35 gap. According to Statista (2022), the largest demographic to play videogames is the age group of 18 to 34 year olds, representing 36% of games in the US. 35 to 44 takes 13%, while 45+ takes a totalled 27% of the gaming population. Under 18-year-olds represent 24% of the population. If we remove the Under 18-year population and reflect the segments to what was received in the survey, there is still some bias in the population of the respondents. The 18 to 34 group takes 76% compared to the expected 47%, while the 35 to 44 age group is incredibly accurate at 17% from an expected 17%. The 45+ group is sorely lacking, with a measly 9% compared to the expected 36%.

How much time do you spend playing video games weekly on average?

Number of respondents: 55



	n	Percent
0-2 hours	8	14,5%
2-7 hours	27	49,1%
7-14 hours	15	27,3%
14+ hours	5	9,1%

Figure 2 Distribution of respondents per play time

The second demographical question and the first of gaming specific questions is “How much time do you spend playing video games weekly on average?”. With this question, there is always the caveat of people estimating their own time spent incorrectly or wanting to polish their image by saying they play less than they do, even though the survey was anonymous. Another clear caveat is again the demographics of the researcher’s social circle, where most people are at the beginning of their careers and active in many ways,

thus leaving less time for video games. On the other hand, some of the researcher's social circle are very active in the gaming scene, most likely filling out some of the higher amounts of weekly playtime. Out of the 55 respondents just under half, 27, replied that they play from 2 to 7 hours weekly. The second largest group was those who play 7 to 14 hours, with 15 respondents, followed by 0-2 hours at 8 and 14+ hours at 5 respondents.

What platform/s do you play on?

Number of respondents: 55, selected answers: 85

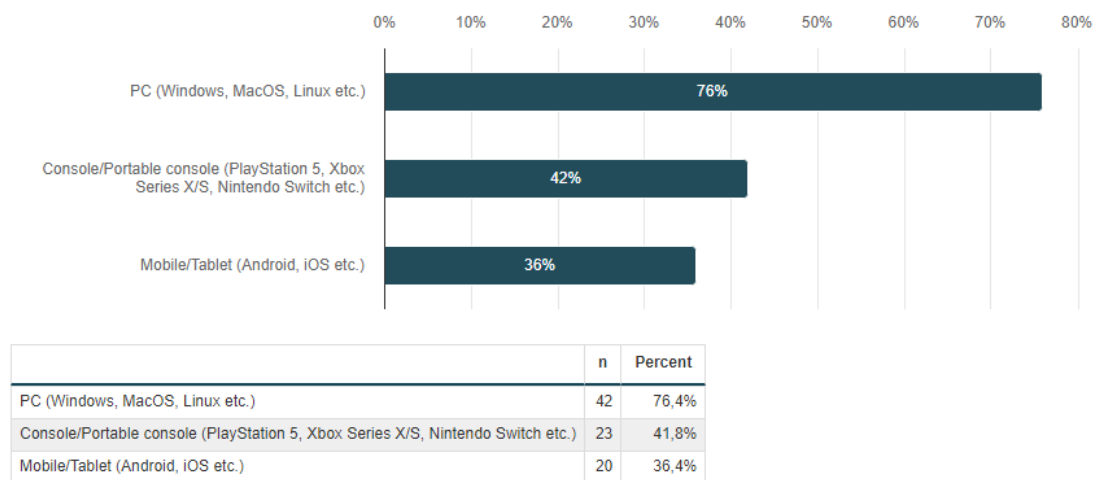
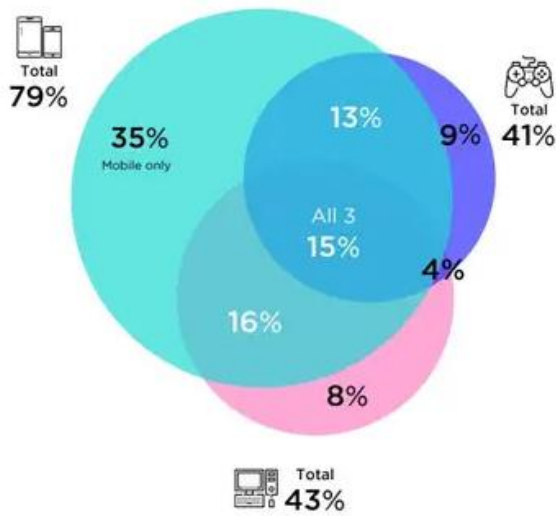


Figure 3 Distribution of respondents per gaming platforms

The third demographical question handled the platforms that the respondents use to play video games. Out of the 55 respondents, 42 play video games on their personal computer, while a little under half of the respondents play on Console (23 respondents) and mobile (20 respondents). Comparing the results from the survey to the global player statistics collected by Newzoo (2023) in their global gamer study gives us some clear parallels, but also some stark differences. You can see their Venn diagram with percentages in figure 4. The greatest difference is in the fact that PC and mobile as platforms have switched places, with 76% compared to 43% and 36% compared to 79% respectively. The players that play on multiple platforms are represented in the survey as follows: PC+Console players represent 18% of the population (compared to 4%), PC+Mobile 17% (compared to 16%), Console+Mobile 6% (compared to 13%) and PC+Console+Mobile 7% (compared to 15%). 41% of players played on 2 platforms, compared to the 32% in the Newzoo (2023) study.

Platform overlap
Base: Total players



Number of platforms played on
Base: Total players

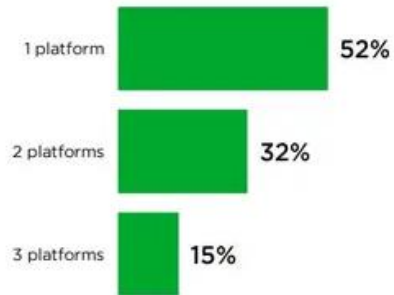


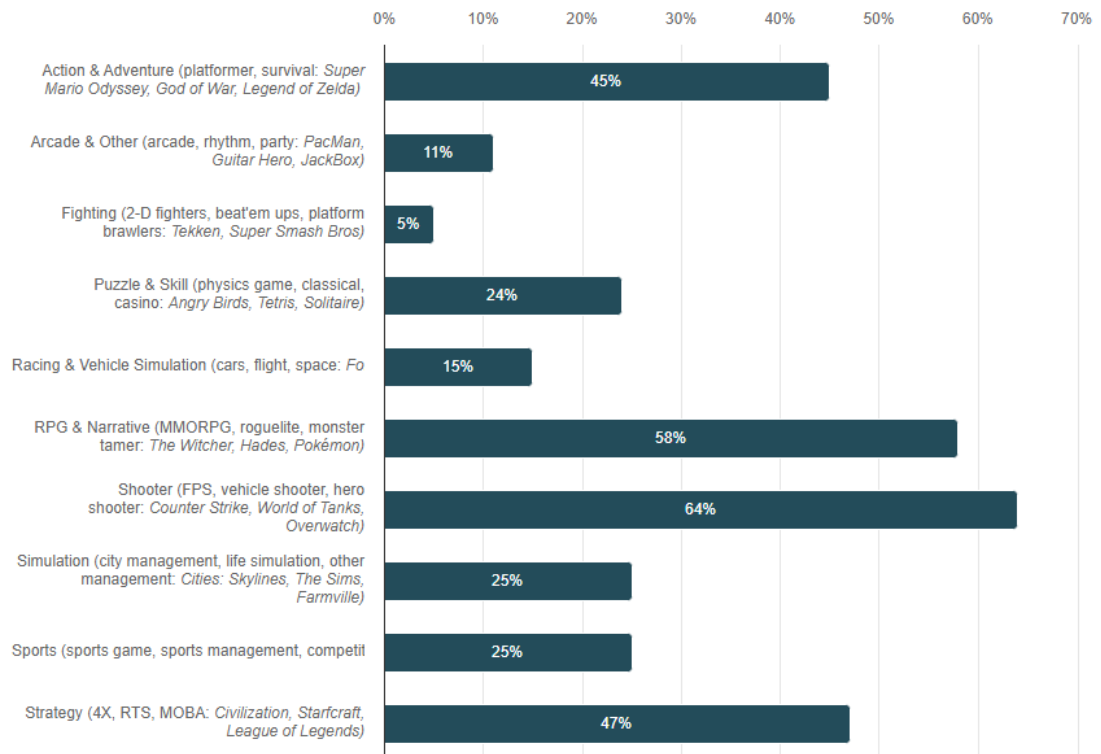
Figure 4 Platform overlap Venn diagram by Newzoo (2023)

This statistic may once again be a little skewed, with the survey also being published via a Discord channel, which is social platform primarily used by PC users, as well as by the structure of the researcher's survey's reach.

Which genre/s of video game/s do you play?

Genre (typical subgenre: example game)

Number of respondents: 55, selected answers: 176



	n	Percent
Action & Adventure (platformer, survival: <i>Super Mario Odyssey, God of War, Legend of Zelda</i>)	25	45,5%
Arcade & Other (arcade, rhythm, party: <i>PacMan, Guitar Hero, JackBox</i>)	6	10,9%
Fighting (2-D fighters, beat'em ups, platform brawlers: <i>Tekken, Super Smash Bros</i>)	3	5,5%
Puzzle & Skill (physics game, classical, casino: <i>Angry Birds, Tetris, Solitaire</i>)	13	23,6%
Racing & Vehicle Simulation (cars, flight, space: <i>Forza, Microsoft Flight Simulator, Kerbal Space Program</i>)	8	14,5%
RPG & Narrative (MMORPG, roguelite, monster tamer: <i>The Witcher, Hades, Pokémon</i>)	32	58,2%
Shooter (FPS, vehicle shooter, hero shooter: <i>Counter Strike, World of Tanks, Overwatch</i>)	35	63,6%
Simulation (city management, life simulation, other management: <i>Cities: Skylines, The Sims, Farmville</i>)	14	25,5%
Sports (sports game, sports management, competitive: <i>NHL, Football Manager, Rocket League</i>)	14	25,5%
Strategy (4X, RTS, MOBA: <i>Civilization, Starcraft, League of Legends</i>)	26	47,3%

Figure 5 Distribution of respondents per game genres they play

The fourth and final demographical question was that of which genres of video games the respondents play. There were a few standout most popular genres, namely Shooter at 35 respondents and RPG & Narrative at 32 respondents, as well as a few clearly underrepresented genres like Fighting at 3 respondents, Arcade & Other at 6 and Racing & Vehicle Simulation at 8 respondents. The popularity of the shooter genre is not that surprising, with some of video gaming's biggest titles (Fortnite, the Call of Duty series, the Halo series) being shooters available on a multitude of platforms.

When cross-referencing the demographical data, some interesting datapoints arise. The 45+ age group is clearly the group that plays the least amount of time per week, with 75% of the respondents playing 2-7 hours weekly, and 25% 0-2 hours weekly, compared to the average of 49.1% and 14.5% respectively. Another deviation from the average is that 22-28 year olds are overrepresented in the 7-14 hours per week category (37.5% to the 27.3% average), but inversely so in the 14+ hour category (6.3% to the 9.1% average). The 45+ age group is also well below the average in all other gaming platforms other than mobile, where they reach a whopping 100% respondents compared to the measly 36.4% average. Consoles on the other hand seem to be more popular among the 28-35 age group, with 53.8% playing on consoles compared to the 41.8% global average. This reflects the popularity of consoles shown by Statista (2023d), where 30-39 year olds were the age group with the largest presence (33%) in the console gaming audience, followed by 20-29 year olds with 28%.

When we come to the popularity of video game genres, we can once again see some clear disparity between the age groups. The first notable difference is the popularity of the Arcade & Other genre among the 35-45 age group, with a 22.2% score over the 10.9% average. Fighting games are also clearly in the minority and played only by age groups 22-28 and 28-35. Puzzle & Skill genre was also very underrepresented in the 22-28 age group, with only 12.5% playing them compared to the 23.6% average. Shooter games drop in popularity with the 35-45 age group, scoring at 44.4%, well below the 63.6% average. The 35-45 age group was also surprisingly completely absent from the members of respondents that play sports games, compared to the 25% global average.

The amount a respondent played computer games per week was clearly reflected in which platforms they play on. 100% of the respondents that play over 14 hours per week identified PC as one of their gaming platforms and 93.3% of those who play 7-14 hours. Out of all respondents, 76.4% play video games on their personal computer, with only the 0-2-hour demographic coming in at 50% PC players. The inverse is true for console/portable console players and mobile/tablet players, where the demographics above the average of 41.8% and 36.4% respectively were the 0-2-hour players and 2-7-hour players, with 7-14 and 14+ clearly below the global average.

The time spent playing video games was not as concretely shown to influence what video game genres a respondent played. A few notable findings would be the fact that sports

and Puzzle & Skill were relatively close to their global averages of 25.5% and 23.6% across the board and the fact that Action & Adventure games were well below the average among the players who played the least and those that played the most. RPG & Narrative and Shooter games were expectedly prevalent in the demographic that played the most, coming in at 80% and 100% representation compared to the 58.2% and 63.6% averages, as well as Simulation games to a lesser extent with 60% compared to 25.5%.

The choice of platform had some expected reflections on what games respondent played. One notion was that out of all PC players, over 60% played on another gaming platform as well, while the same number for Console/Portable console and Mobile/Tablet respondents was under 35%. Action & Adventure games were clearly most popular on consoles, with 73.9% of Console/Portable console players playing them compared to the 45.5% average. Arcade & Other and Puzzle & Skill were expectedly most played by Mobile/Tablet respondents, with 25% to 10.9% global average and 40% to 23.6% global average respectively, corroborating the statistics where hyper-casual games are the most popular games among mobile video game players (Udonis, 2024). Shooter games were the most universally popular, with over 63% of players across the board spending time playing them and the respondents of no platform falling below 60% representation. The only other genre that reached a global average popularity over 50% was RPGs, with Console/Portable console players having a very high number of respondents that played them, in 78.3%. The Simulation and Strategy genres were expectedly more prevalent in the PC gamer demographic, stemming from the match of UI to game content. On the other hand, Sports games were more popular among Console/Portable console and Mobile/Tablet gamers.

3.4 Analysis Process

The number of respondents to the survey was quite low. An n of 55 respondents and the structure of the survey allowed a descriptive survey methodology to be adopted, looking for correlations in the limited data set. Williamson and Johanson (2018) described descriptive surveys as an appropriate tool for gathering “facts or information and distribution of certain variables within the population”. In this research, the population is video game players, and the variables are age, platform(s), genre and competences, aiming to describe the connections therein. A descriptive survey analysis method is also

very flexible, fitting this research as the survey provided quantitative data on a qualitative subject.

The analytical process in this research was split into three parts: first, determining the demographics of age, platform(s) and genre of the respondents, and searching for any obvious correlations. Second, the competences and their ratings were analysed and compared against each other. Third, the competences developed were reflected on demographics, to find out if there are any significant correlations between specific demographics and perceived attained competences.

3.5 Research ethics

In the development of the survey, there was a choice to delve deeper into demographical data. More specific data could have been collected to see if there are more differences between demographics, such as the gender, career, educational background or location of the respondents. These could have provided interesting insight, but also would have meant that the data collected could be connected to a specific person with effort. These demographics would also not have supported the research questions of the study, nor would they have had a meaningful effect in supplying answers to them. The one personal demographical question that was asked was the rough age group of the respondents. This demographic was collected to attempt to measure the change of perceptions of video game players across the time continuum. Video games have risen to prevalence in the last few decades and attitudes towards them have changed significantly. No emails or other contact information was collected either, leaving the respondents anonymous.

4 Results

4.1 Survey results

4.1.1 Competences

The competences were divided into the following three groups for the purpose of the survey: Cognitive, Motivational & Emotional, and Social. The respondents rated each competence on a scale of 1-4, where 1 was None, 2 was Unsure, 3 was Some and 4 was Significant effect on the development of said skills. In this first chapter we will go through responses per competence, before drilling down to how specific demographics affected how gamers view games as something that develops the selected competences. The percentages per response across all competences were distributed as follows: 9.3% None, 20.4% Unsure, 43.3% Some and 27% Significant, positioning the 90.7% of the answers between Unsure and Significant, leaning towards some positive causality perceived by players on the effect of playing video games into competence development. The competences grouped under the subcategory Cognitive received the highest percentages of high scores across the subcategories. Only 4.8% of replies provided a None answer, with 19.4% in Unsure, 48.8% in the Some effect of the development of mentioned competences. Remarkably, 28.1% of players found that their Cognitive competences had been Significantly improved by playing video games as a hobby. The two other competence categories of Motivational & Emotional and Social finished with similar scorings to each other, 9%/22.8%/43.2%/24.9% and 14%/19%/39%/28% respectively, so with a little less perceived effect compared to Cognitive competences.

Cognitive

Number of respondents: 55

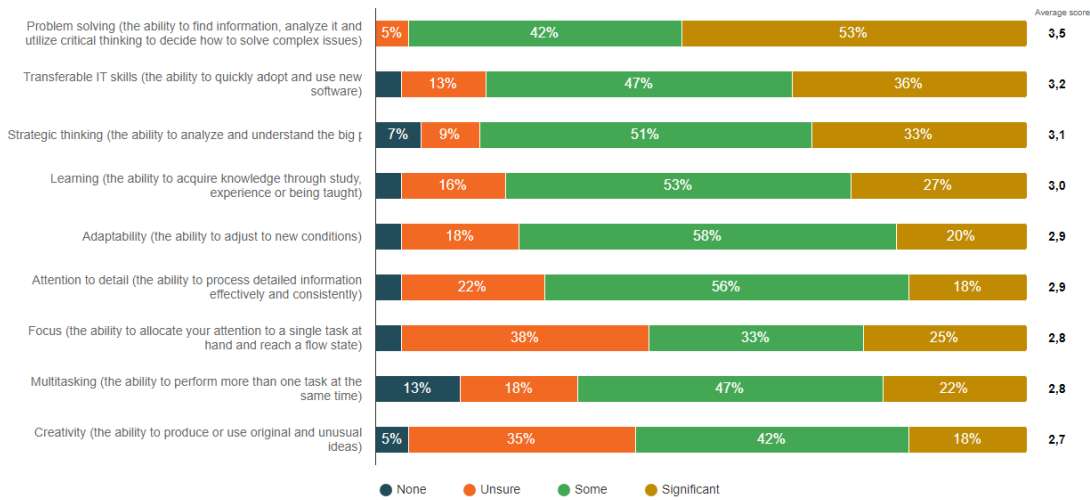


Figure 6 Perceived development of competences in the Cognitive subcategory

Delving deeper into each category of competences, we first come to the Cognitive competences category. One of the clear standouts from the data is the fact that over half (53%) of respondents viewed that gaming has affected the development of their problem-solving skills significantly. In addition, 42% of respondents viewed that gaming had had some effect on their problem-solving skills, so 96% of respondents perceived a positive causality between playing video games and the development of their ability to solve complex problems. It was also the only competence that had no respondent giving it a “None” score. Problem-solving had the second highest score out of all the competences in the survey.

Other data points a step above the pack were Transferable IT skills (3.6%/12.7%/47.3%/36.4%) and Strategic thinking (7.3%/9.1%/50.9%/32.7%), with over 30% of respondents perceiving significant positive effect on the development of those skills. The lowest scores were received by Creativity, with a score of 5,5%/34,5%/41,8%/18,2%. This was driven by 35% of the respondents scoring Creativity as Unsure. The current view is that creativity is a competence that can be developed, but on the other hand most games do not allow for true creativity, but rather problem-solving with the tools that are available (Cabelkova et al., 2020; Dong et al., 2017). Creativity did not have the most amounts of None scores in the Cognitive category. Multitasking had a score of 12,7%/18,2%/47,3%/21,8%, where noticeably out of all respondents the highest percentage in the category reported that gaming had had no positive effect on their multitasking capabilities.

Motivational and Emotional
Number of respondents: 55

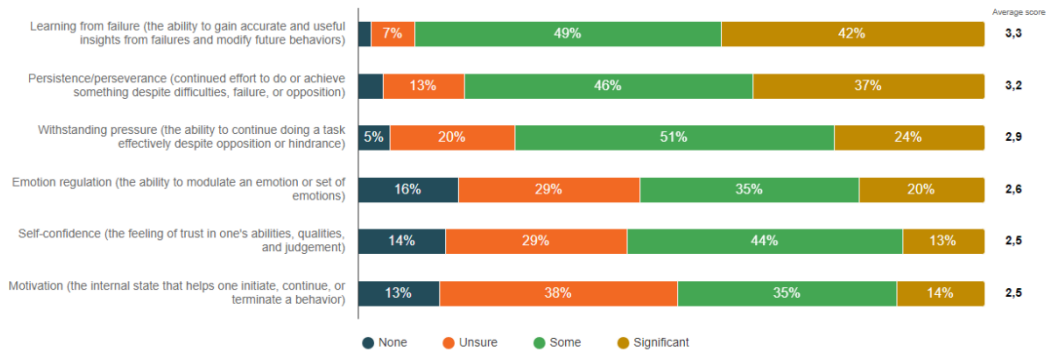


Figure 7 Perceived development of competences in the Motivational and Emotional subcategory. In the Motivational and Emotional competences category, the perceived effect by gaming was scored by respondents at 9%/22.8%/43.2%/24.9%. There were two clear top scorers, with Learning from failure finishing with 1,8%/7,3%/49,1%/41,8% and Persistence/perseverance with 3,7%/13,0%/46,3%/37,0%. Withstanding pressure scored just above the category-peers with a scoreline of 5,5%/20,0%/50,9%/23,6%, leaving the last three of the competences clearly below in their scores. Learning from failure also had only one respondent giving it a score of None, the second lowest in the survey. Interestingly Learning from failure and Persistence/perseverance are two branches from the same tree of continuous effortful engagement and wanting to finish something you've started, so the correlation seems to be sensical.

Emotion regulation, that scored at a 16,4%/29,1%/34,5%/20,0%, had the cleanest split between respondents that gave a different answer, with 9 None, 16 Unsure, 19 Some, and 11 Significant answers. At the same time as it was one of the lowest scoring competences throughout the survey, gaming was still perceived by 55% of respondents to have had some or significant effect on the competence's development.

Social

Number of respondents: 55

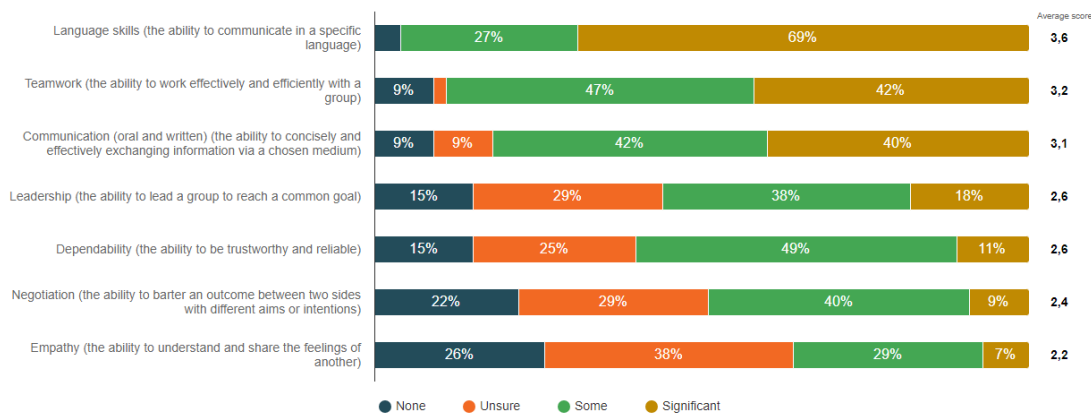


Figure 8 Perceived development of competences in the Social subcategory

The competences grouped under the Social category had the largest variety in terms of scoring. It contained both the highest scoring competence of Language skills at 3,6%/0,0%/27,3%/69,1% score as well as the clearly lowest by a clear margin in Empathy, finishing with a measly 25,4%/38,2%/29,1%/7,3%. Language skills received overwhelmingly the most Significant scores, at 69% of the respondents ranking its effect as Significant. It was also supported by 27% of respondents ranking it at the Some level. What reflects on the demographics of the respondents is the fact that there were no Unsure rankings and 4% of the respondents ranked Language skills as None. This could be explained by the fact that in Finland, very few games go through a localization process. The majority of games in Finland do not offer Finnish localization and are thus consumed in English by adults, while in other countries the games might be localized in to the local language as per the dubbing of TV-shows. (Gambier et al., 2014; Jing Wei et al., 2022.) The 4% could be explained by the fact that the researcher's network has a number of people that are native English speakers, and thus don't get the same effect on their language skills as Finns do.

The low score of empathy can be explained by a few factors. Firstly, multiplayer games are often competitive, garnering killer instincts and the willingness to do most things for the sake of winning. Communication is also usually limited, which impedes the emergence of empathetic interactions. Thirdly, it might be difficult to feel empathy towards Non-Player Characters (NPCs) in single player games. Empathy and the lack of it has been widely publicized in the media, but researchers are finding that pro-social and neutral video games as well as cooperation in video games can lead to developments of a

players empathetic skills as well as their prosocial behaviors. (Greitemeyer, 2013b; Greitemeyer et al., 2010; Happ, 2014.)

Two other competences finished clearly above the global distribution. Teamwork at 9,1%/1,8%/47,3%/41,8% received a large amount of both Significant (47%) and Some (42%) votes. Teamwork is one of the competences that shows up in most multiplayer games. Be it PvE (Player vs. Environment) or PvP (Player vs. Player), a majority of popular modern multiplayer games offer a team-based experience, where effective teamwork is a precursor to success. (Cubix, 2022.) This also goes hand in hand with the other competence with high scores, with the Communication competence (9,1%/9,1%/41,8%/40,0%) being an important driver of effective teamwork. The mediums of communication are quite varied in video games. The more traditional ones are text-based chats and built-in or external VoIP (Voice over Internet Protocol) tools such as Discord. In some games communication has been simplified with built-in tools, such as emotes, like “wave” or “point” or emoticons in the style of stickers in mobile phone apps. Another more tactical way of communicating that has been implemented in many games is “pinging”, broadcasting a location or target in the game world or on the game map, which will then show up for your teammates in their game world or game map. These can hold a variety of information depending on the context and the message you wish to transmit.

Interestingly, Leadership, that can be quite heavily associated with Teamwork skills, received a clearly lower score of 14,5%/29,1%/38,2%/18,2% compared to Teamwork’s. This may be due to the fact that many games have smaller teams consisting of 2 to 5 players and are usually treated as equal groups, while games that require larger groups for such activities as raiding in World of Warcraft or fleet combat in EVE online, usually have a leadership structure of one or a few leaders leading the rest of the participants, ranging from a few to thousands developing their teamwork skills, through whatever content is being accessed. (Hao et al., 2024; Lisk et al., 2012.)

4.1.2 Delving deeper into the effect of demographics

The average gamer across the respondents of the survey was 28-35 years old, plays video games 2-7 hours per week. They play on 2 platforms, PC and then console or mobile/tablet, and partake in 7 different genres of video games. They view the effects of

video games on listed competences as discussed above. But what if we go a little deeper into the demographics? Are there any clear demographical attributes that effect the perceived effect on competences in a significant way? That is what we aim to explore and define in this segment of the study.

When it comes to age groups, there were only a few competences where age group significantly affected how the respondents viewed gaming's effect on the competence. Two of them were in the Cognitive competences category. In both cases the deviant age group was 45+, which may stem from the limited number of respondents that that group consisted of, with only 4 respondents to the survey. The first competence was Multitasking, where the 45+ age group rated it an abysmal 75,0%/0,0%/0,0%/25,0%, falling a whole point below the global score of 12,7%/18,2%/47,3%/21,8%. The second competence rated lowly by the 45+ age group was Strategic thinking, receiving a measly 50,0%/0,0%/25,0%/25,0% score compared to the 7,3%/9,1%/50,9%/32,7% from all answers.

In the Motivational and Emotional category, Learning from failure was the competence that the age groups were most agreed upon across the whole survey. Otherwise, there were no major deviations from global distribution of answers.

Communication was the first skill with clear deviations by age group in the Social competences category. Once again, the small age group 45+ was the culprit, with respondents being split 50/50 between None and Significant effect landing the competences rating at 50,0%/0,0%/0,0%/50,0%, clearly below the global distribution of 9,1%/9,1%/41,8%/40,0%. With perhaps some relation, Language skills was another competence that was almost universally seen as having benefited from gaming, but the 45+ age group rated it (25,0%/0,0%/50,0%/25,0%) well below the other age groups. With the development of information technology and connectivity around the globe in milliseconds, games have moved from early text-based communications to emotes to voice communication either directly in the video game or via an external platform such as Discord. In parallel the multiplayer games have risen to prevalence and the majority of most played video games are played with other people (Cubix, 2022). The same relation could be seen in Negotiation, with the 45+ scoring it at 50,0%/25,0%/25,0%/0,0% compared to 21,8%/29,1%/40,0%/9,1% global distribution.

In general, the 45+ age group was responsible for the lowest scores across all competence subcategories. Thus, we arrive at a few possible conclusions: those gamers aged 45 and above are more sceptical about being able to gain a positive effect on the surveyed competences OR they play less than other demographics and there is a correlation between amount of time spent playing and competence development OR the members of the demographic have viewed that the public at large has perceived video games as something negative and thus have difficulty correlating competence development with video games. One more and possibly most likely option is that the data is skewed due to the low number of respondents within the demographic.

When it comes to the demographical segmentation according to amount of time played, all of the demographics were within an acceptable variance from the global distribution in the Cognitive competence subcategory. The one thing that does surface from the data is the fact that it wasn't those who play the most (14+ hours per week) that perceived the greatest effect of gaming on competences, but rather the second most playing respondents, the 7 to 14 hours played per week group. They had the highest scores on all but 2 of the 9 competences, those two competences being Problem-solving (where they gave it the second highest score) and Adaptability (again, second highest). There was no massive variance in platforms or genres of games played that would explain this difference. It may be that the players that play the most develop a cynicism towards the development of competences that they might receive from playing video games as a hobby.

In the Motivational and Emotional competence subcategory, there are already much clearer outliers from the pack. Self-confidence was globally rated at a 9,1%/22,8%/43,2%/24,9%, but the 14+ hours played respondents rated it clearly above that with 10,0%/10,0%/46,7%/33,3%. One potential explanation for this is the correlation of time-spent to skill-level, and a higher skill-level leading to higher confidence in your own capabilities. In a medium such as games, where personal or your team's victory is commonly the goal, a higher-skill level translates to more won games. (Goldberger and Gerney, 1990.) The consistency of ratings in the Learning from failure competence was significant across all the demographics split by time played, with all of them scoring the competence in remarkably similar ways.

In the development of competences grouped in the Social-subcategory, there was a clear correlation between playing more and perceiving a greater effect caused by gaming on those competences. The 14+ demographic scored highest and the 7-14 group as second or shared second highest in all the competences in the category. There seems to be a clear dependence on how much time you spend playing and how much you interact socially via the medium. Some players also get a significant portion of their social interactions via online multiplayer games, which are more and more commonly built with social interaction as a core mechanic in the game (Quandt and Kröger, 2013). If you spend most or a significant chunk of your free time playing video games, it is only natural that you would develop your social skills through them as well. There are also multiple popular complex multiplayer video games that require vast amounts of teamwork and communication skills for you to be able to compete successfully. These are also reflected in the scores that are significantly above the global distribution. For Teamwork global distribution is 9,1%/1,8%/47,3%/41,8%, while those who play 14+ hours per week gave it a score of 0,0%/0,0%/20,0%/80,0%, one of the highest scores in the survey. Similarly in Communication with a global distribution of 9,1%/9,1%/41,8%/40,0% and a 14+ group rating of 0,0%/0,0%/20,0%/80,0% as well as Leadership with 14,5%/29,1%/38,2%/18,2% to 0,0%/20,0%/40,0%/40,0%.

Moving onto the effect that a player's chosen platform had on the perceived benefits to competence development from playing video games, we first arrive to the Cognitive subcategory. There are no vast differences in the ratings and the only clearly visible attribute was that mobile players rated the effect the lowest on all but one competence, Adaptability, where Console players scored it only slightly lower. One of the most positively viewed competences in the survey, Problem-solving, was also unanimously valued by players on all platforms. It received very high scores from all demographics.

The competences grouped under Motivational and Emotional were also mostly very well agreed upon across all platforms, with the exception of Self-confidence, which Mobile-player ranked decidedly lower than their PC and Console-gaming peers.

Perhaps expectedly, Mobile players also ranked Social competence development the lowest out of all the platforms, but still mostly in line with other platforms. Thus, it would seem that the platform on which you play, does not make a major difference on how you perceive your skills being developed across PC and Console gamers. Mobile gamers seem

to be a little more pessimistic on many competences, perhaps resulting from the simplicity of many mobile games as to be able to enjoy them with a short amount of time available and the limitations of the control scheme.

Table 8 List of key findings from demographics

1	45+ age group rated gaming's effect the lowest
2	Cognitive competences are mostly rated similarly across the "time-played" and "platform" demographics
3	14+ and 7-14 hours per week demographics perceived the biggest impact in the Motivational and Emotional as well as Social competence subcategories
4	Players on the Mobile platform rated the effect of gaming the lowest in most of the competences, while the PC and Console platforms were mostly neck-and-neck

4.1.3 The effect of genres

Compared to the minute variances between video gaming platforms, the genres that gamers consumed had a much broader effect on their perceived gains on listed competences. The first outlier to be focused on is Arcade & Other, that scored every competence in the bottom four out of ten, most of them as the very lowest ranked one. The most egregious variances were with the competences of Learning and Strategic thinking. The clear majority of Arcade & Other gamers (83%) play on Mobile platform and 67% of them play 2-7 hours per week, both of which have had a negative effect on the perceived competence development, providing a contextual explanation to the low scores. On a competence specific level, Focus scored very highly among the two simulation genres, with Racing & Vehicle simulation at 0,0%/25,0%/37,5%/37,5% and Simulation at 0,0%/28,6%/14,3%/57,1%. They also had high scores similar to each other in the ranking of the Learning competence, rating it 0,0%/12,5%/50,0%/37,5% and 0,0%/7,1%/64,3%/28,6% respectively, compared to the 3,6%/16,4%/52,7%/27,3% global distribution. The Fighting genre had a high amount of variance when it came to its ranking according to score in the Cognitive competence subcategory. It finished some competences with the absolute highest score (Learning at 0,0%/0,0%/66,7%/33,3%, Problem-solving at 0,0%/0,0/33,3%%/66,7%, Transferable IT skills at 0,0%/0,0/33,3%%/66,7%, and Creativity at 0,0%/33,4%/33,3%/33,3%) and in juxtaposition some of the at the very lowest score (Focus at 0,0%/66,7%/33,3%/0,0%, Adaptability at 0,0%/66,7%/33,3%/0,0%). Outside of those competences, it finished

somewhere in the middle of the pack. One of the key contributors to this widely varied data is the fact that there were only 3 respondents that admitted to playing video games that belong in the Fighting genre, and thus the results may not be very representative of fighting game players at large.

Puzzle & Skill games had also clear disparity between the competences that players viewed as having been affected by gaming as a hobby. The competences that stood out in regard to Puzzle & Skill were Learning (ranked second lowest at 7,7%/23,1%/53,8%/15,4%), Adaptability (ranked shared highest at 0,0%/7,7%/61,5%/30,8%), Problem-solving (ranked second highest at 0,0%/0,0%/38,5%/61,5%, perhaps expectedly for a genre that's core premise revolves around solving problems), and Multitasking (ranked shared lowest at 23,1%/7,7%/69,2%/0,0%). Hsu and Wang (2018) found that puzzle games help develop algorithmic thinking skills, which in turn result in an improved performance in Problem-solving in similar tasks as the one achieved before.

The two genres with most players altogether in RPG & Narrative and Shooter games shared a lot of parity in their ratings, landing them close to the centre-line on all of the competences in the Cognitive competence subcategory except for a few. The exceptions to this rule were Learning, where RPG & Narrative scored a 0,0%/12,5%/50,0%/37,5%, a shared top rating compared to Shooter's significantly lower 2,8%/14,3%/60,0%/22,9%. RPG & Narrative games are often built with multiple complex systems and require the player to learn to use those to their advantage (Vieira Pak and Castillo Brieva, 2010). The other competence with a noticeable difference was Strategic thinking, where the Shooter genre eked out a slight edge with 2,8%/8,6%/48,6%/40,0% compared to RPG & Narrative's 6,2%/12,5%/46,9%/34,4%. One of the explanations for this could be the fact that many Shooter games are militaristic in nature, perhaps leading to them being viewed as more strategic from the players' perspective. Interestingly the Shooter and Strategy (0,0%/11,5%/50,0%/38,5%) genres were very closely ranked in the Strategic thinking competence.

Moving on to the subcategory of Motivational and Emotional competences, the data shows once more that the genre of Fighting games has a very high level of variance in its scores with no discernible patterns. It has the highest score in Self-confidence by a clear margin at 0,0%/0,0%/66,7%/33,3%, and also finishes with the top rank in Emotion

regulation. On the other hand, it has the lowest score in Learning from failure at 0,0%/33,4%/33,3%/33,3% and second to lowest in Motivation. This is once again most likely due to the low number of respondents that submitted that they play Fighting games, but also bears some further looking into. One other standout in the Motivational and Emotional competences is the Arcade & Other genre which only had 6 respondents. It had the lowest scores in Self-confidence (33,3%/50,0%/0,0%/16,7%), Motivation (33,3%/66,7%/0,0%/0,0%) and Persistence (0,0%/50,0%/50,0%/0,0%). According to this data, it seems that games grouped in the Arcade & Other genre or gamers who consider themselves Arcade & Other consumers view the potential gained competences in a much more pessimistic light compared to players of other genres. This was already shown in the Cognitive competences subcategory and is reinforced here.

One other standout in the data would be the high scores of the Sports games genre, which finished above the genre compatriots in the subcategory with a 7%/23%/39%/31% rating, with the genre rating especially high in the Learning from failure competence (0,0%/7,1%/28,6%/4,3%) and Withstanding pressure (7,2%/7,1%/50,0%/35,7%). Perhaps in a similar vein, the Racing & Vehicle simulation genre scored very highly in some of the competences of the Motivational and Emotional subcategory. Particularly Learning from failure (0,0%/0,0%/37,5%/62,5%), Motivation (0,0%/12,5%/87,5%/0,0%) and Persistence (0,0%/12,5%/12,5%/75,0%) stood out, for which a possible attributor could be the repetitive nature of racing games. In a race or a time trial, you finish multiple laps of the same circuit. This makes it a perfect environment for learning from failure, as you can always reflect on what you could do better compared to your previous lap or race. It also means that usually, even if you fail, you still have a chance to catch up. Some games even give you tools that help you catch up to your rivals, such as the Blue Shell in Mario Kart games. (Cechanowicz et al., 2014.) The Shooter genre continued with a very high scoring compared to the global distribution of, while the other largest collection of players in a subgenre, RPG & Narrative, was more along the average results.

The Social competence subcategory has some of the biggest variance not only with genres within competences, but also between competences themselves as discussed earlier. There are some quite interesting points of data to decipher, so let's begin with discussing some of the lowest scoring competences. The Empathy competence was, as mentioned,

the lowest scoring competence in the whole survey with a score of 25,4%/38,2%/29,1%/7,3%. Major contributors to this low score are the common denominators of low competence effect recognition in the Motivational and Emotional subcategory: Arcade & Other and Puzzle & Skill, as well as the low participant genre of Fighting games. Arcade & Other players rated the competence at a paltry 33,3%/66,7%/0,0%/0,0%, Puzzle & Skill at a 38,5%/46,1%/15,4%/0,0%, and Fighting at a marginally better but still well below the majority at 0,0%/100,0%/0,0%/0,0%. These low scores are reflected in most of the rest of the competences in the Social subcategory, with a few notable exceptions to be noted below. But there is some logic to the low ratings by players of these genres. Firstly, they are mostly single-player games or if multiplayer, then usually versus mode instead of team vs. team or cooperative. The games are also in general a little shallower, with not much of a story or player interaction with other player or characters in a non-competitive environment.

One of the notable exceptions for the genres mentioned above in the Social competence subcategory is Dependability, where Fighting and Puzzle & Skill gave shared top ratings of 0,0%/33,3%/66,7%/0,0% and 15,4%/23,1%/38,4%/23,1% to the competence, compared to the 14,5%/25,5%/49,1%/10,9% global distribution. Fighting games were also the absolute top finisher in the Language skills competence, with all Fighting game players viewing the effect of video games on their language skills as significant. In the same competence, Arcade & Other was clearly the lowest at 0,0%/0,0%/66,7%/33,3%, significantly below the next lowest scorer. This might be in part due to the fact that many Arcade & Other games are quite shallow and do not require much in the way of learning or communicating to be able to understand the gist of the game and to be able to do well in it. Arcade Games such as PacMan are usually described by the phrase “easy to learn, hard to master”, where most of players will remain in the “easy to learn” half of the dichotomy (Gao et al., 2022). Outside of these exceptions, Arcade & Other, Fighting and Puzzle & Skill games finished somewhere close to or at the absolute bottom of the pack.

A number of the highest scorers in some of the competences in the Social subcategory are quite surprising when reflected to the two other competence subcategories. For example, there is a much clearer distinction between RPG and Shooter games, to the benefit of the latter. Shooter games are again edging out ahead of RPG games in all but two of the competences, Language skills and Negotiation, where the genres are tied. Quite surprisingly, Empathy is ranked higher by the players of Shooter games by a noticeable

margin. This seems to support the fact that, despite decades of media slander and anecdotal evidence attempting to connect the Shooter video game genre into violence, very little to no scholarly consensus has been reached directly connecting the two (Smith et al., 2018). In the competence of Teamwork, the gap is also clear. This may be explained in part by the fact that the RPG & Narrative subcategory holds not only MMORPGs (Massively Multiplayer Online Role-Playing Games), that are known for their intensive requirement for teamwork to beat the game's most difficult content, but also single-player games. Had the two categories been separated, it might be that there would have been a clear difference between the competences derived from them, especially in the Social competence subcategory.

Table 9 List of key findings from genres

1	The research suggests that the selected game genre has a direct effect on what competences and competence subcategories can be developed as a by-product of gaming-as-a-hobby, and that very rarely does a single game genre support development in all the listed competences.
2	Some genres correlate across the board or in a specific competence sub-category, such as Simulation and Racing & Vehicle Simulation, and RPG & Narrative and Shooter
3	Social subcategory competences expectedly receive higher scores from players of games with more cooperation and social interaction

5 Conclusions and limitations

5.1 In conclusion

With the rise of video games to the mainstream in the last few decades, more and more research has been conducted on the effects of gaming on video game players. A lot of the research and media attention has focused on the negative effects of gaming on video game players, but more recently a significant portion of the research has been moving towards the benefits of video games. From previous research it seems clear that video games can work as an effective tool for developing a selection of competences and personal attributes in those that play video games as a hobby. Current literature has focused heavily on cognitive competences and action video games, perhaps as a counter for the perceived negative effects that video games are reputed for having on the development of adolescents. But the topics of research have recently been selected from a broader number of perspectives, bringing in the social, emotional, and motivational competence development of playing video games as a hobby as well as focusing on a number of other video game genres as well.

In research focusing on the benefits of video games, cognitive competences are clearly the most well represented. Especially highly connected to video games have been the competences of Focus (attention allocation, mental flow), Learning (learning to learn, memorization), Adaptability (flexibility, dealing with unpredictability) and Attention to detail (sensory perception, visual processing). The benefits to these competences are well researched and documented. Multitasking, Strategic thinking (planning) and Problem-solving (analytical, critical thinking) as competences are more context specific and contested when considered regarding their development while playing video games as a hobby. They relied more on the demographics of the player and the selection of game genre than the previous group of competences. Less strong connection of playing video games as a hobby to the development of cognitive competences was found with Transferable IT skill (digital nativity, computer literacy) and Creativity. Both subjects have been researched very little, but with some studies providing very encouraging results for the development of these competences.

Table 10 The competences attainable from playing video games as a hobby

Subcategory	Competence
Cognitive	Focus
	Learning
	Adaptability
	Problem-solving
	Attention to detail
	Creativity
	Transferable IT skills
	Multitasking
	Strategic
Motivational and Emotional	Self-confidence
	Emotion regulation
	Learning from failure
	Motivation
	Persistence/perseverance
	Withstanding pressure
Social	Teamwork
	Communication
	Empathy
	Dependability
	Language skills
	Leadership
	Negotiation

Research on the effect of video gaming as a hobby on the development of Motivational, Emotional and Social competences is in its infancy compared to the research connected to cognitive competences. All of them have some research that support the positive correlation between gaming as a hobby and the development of specific competences, but there is no scientific consensus on whether there is a connection or not. The few competences that do emerge from the group with more evidence in support are Persistence (perseverance, continuous effortful engagement), Teamwork (collaboration, communication) and Communication (written, verbal). These have clear connections to the core philosophy of all games in the case of Persistence (try again to succeed) and the core philosophy of multiplayer games in the case of Teamwork and Communication.

Another competence that's development via video gaming as a hobby is wholly context dependent is Language skills. For English-as-a-foreign-language learners video games have been recognized as a great tool for developing vocabulary and understanding in English, but the effect is clearly most visible with players that do play games in a language foreign to them.

These competences were then reflected against the competences necessary in a modern work environment. The first conclusion drawn was that competences that are wholly context-specific, such as technical know-how, are less and less in demand when it comes to knowledge workers. Their fall has happened in favour of competences that are more easily described as personal attributes, or even soft-skills, which are the focus of a growing number of organizations hiring policies. These competences have also made their way to the curricula of universities that are aiming to provide the necessary competences for their graduates to succeed in their careers. The most prevalent competences are Teamwork and Communication, both present in essentially all previous research in regard to sought after competences and university curricula. Beyond those competences, Dependability (ethics, honesty, integrity), Problem-solving, Leadership, Adaptability and Creativity are also well represented and desired. A few competences are minutely present in previous research, but that may be due to their duplicitous nature of being two sides of the same contentious coin: Focus and Multitasking. Focus and reaching a flow state can be beneficial, but also detrimental if you need to be able to switch tasks quickly. Multitasking on the other hand can be a sign of efficiency of handling multiple tasks in parallel but can also mean that an employee could have difficulty focusing on a task at hand in an environment full of unexpected stimuli. These competences are almost directly connectable to the competences that have reportedly been developed by playing video games as a hobby but are more focused on Social competences in an inverse of gaming-based competences research.

Players themselves provide an interesting insight into their perceived development of these competences. Across all competences, video game players seem to think that video gaming as a hobby has some effect on the development of listed competences. Cognitive competences were the ones mostly found to have gained some benefit, while Motivational and Emotional as well as Social competences were not quite as highly valued. All three

competences were very near to the global answer distribution. It seems that the competences developed by video gaming as a hobby can range across all subcategories. Some competences finished clearly above the global distribution in their subcategory as well as among all competences: Problem-solving and Transferable IT skills from Cognitive, Learning from failure and Persistence/perseverance Motivational and Emotional, Teamwork and Language skills from Social. Conversely, some competences received scores significantly lower than the global distribution, including: Self-confidence, Emotion regulation, and Motivation from Motivational, and Empathy, Dependability, Leadership, and Negotiation from Social. The Cognitive subcategory had no competences in this group. The absolute highest and lowest global distributions among all competences were received by Language skills and Empathy, accordingly. They are both within the Social competence subcategory.

When diving deeper into demographics, there were some clear patterns that emerged. The survey received no responses by gamers in the 18-22 age group, so the data doesn't include their information. All the age groups were within reasonable distances of the global and subcategory distribution, with the exception of the 45+ age group, who landed significantly below the scores of other age groups in most competences. The 45+ age group surprisingly provided the highest scores in a few competences in the Motivational and Emotional subcategory, namely Emotion regulation and Persistence/perseverance.

In amount of time played, there were some interesting standouts: playing more does not mean that you automatically perceive that you develop competences to a greater level, in fact it was the 7-14 group that gave the highest scores in many competences. There were clear correlations with time spent playing video games being high to the development of Social competences such as Teamwork and Communication. If you spend a significant chunk of your free time playing video games, you seem to be more likely to develop these competences from video gaming as a hobby. Conversely to expectations, playing a smaller amount of time did not mean a huge drop in perceived competence development. The 0-2 and 2-7 hours per week players were mostly reasonably close to the global and subcategory answer distributions.

According to the results, PC and console gamers have very minute differences between what competences are perceived to receive the greatest effect from video games as a

hobby. It seems that these two mainstay gaming goliaths generate the same kinds of perceived positive effects onto the competences of their players, with no significant differences between the two. The gamers playing on mobile offer a small, but clear difference, though. They gave the lowest scores in the vast majority of competences, even if the distances were not massive. The research would seem to suggest that mobile gaming is the least valuable for competence development as perceived by gamers.

Video game genre, on the other hand, seems to have a great effect on perceived competence development. The genre that achieved low scores across the board was Arcade & Other, which was the lowest scorer in all but a few competences. Other than that, it seems that many genres had specific competences that the player perceived the game genre to develop more than others. This seems to suggest that specific video game genres could be targeted in the hopes of developing certain competences.

Table 11 Synthesis of report findings

1	The oldest players see the least benefit from playing video games as a hobby
2	Cognitive competences are mostly rated similarly across the “time-played” and “platform” demographics
3	The players that play the most perceived the biggest impact in the Motivational and Emotional as well as Social competence subcategories
4	Players on the Mobile platform rated the effect of gaming the lowest in most of the competences, while the PC and Console platforms were mostly neck-and-neck
5	The research suggests that the selected game genre has a direct effect on what competences and competence subcategories can be developed as a by-product of gaming-as-a-hobby, and that very rarely does a single game genre support development in all the listed competences.
6	Some genres correlate across the board or in a specific competence sub-category, such as Simulation and Racing & Vehicle Simulation, and RPG & Narrative and Shooter
7	Social subcategory competences expectedly received higher scores from players of games with more cooperation and social interaction

5.2 Limitations and potential research

The study suffers from lack of n in respondents. 55 respondents means that some groups of players may be misrepresented, with only 5 respondents in a specific demographic. This means that some of the underrepresented demographics could have, due to sheer luck, had very similar or very different types of players in it. An average from 5 people is difficult to find meaningful, since even one extreme case can shift the average significantly. With a larger dataset, a more rigid use of quantitative research methods

could have been employed and more dependable research data gathered. As a future research case, a more specific data set could also be gathered: what games players play on what platforms, do they play predominantly multiplayer or single player games, how long have they played a specific type or genre of game. Other longitudinal studies on the exact effect of video games on specific competences would help build solid evidence to support the mostly theoretical research.

This study is not taking into account the possible negative effects that gaming can have on the employment of a person, or its effects on their performance in their tasks. Most of the research on the effects of gaming has been on the negative side of the dichotomy, describing the potential harms of video games. While video games can improve motivation control, they can also affect your motivation to work negatively, as you might prefer to spend your time on a more rewarding activity, such as playing video games. Another limitation and a potential direction for future research is the lack of identification of what attributes in games are the ones that are most valuable to aid in attaining listed competences, so targeting a specific genre of games requires deeper research. (Junttila et al., 2022.)

There is also a lack of evidence that the competences gained from playing video games would be generalizable to other tasks, that instead the increased skills would only translate to that single task or in this case, video game (Sala et al., 2018). But inversely it has also been suggested that playing a game that develops a specific competence or executive function, that the development of that specific competence leads to developments in other unrelated competences or executive functions. This effect is known as General Transfer. (Oei and Patterson, 2014.) A study of how video game players fare in their work tasks compared to non-video game players could shed some light on what kind of correlations do video games have on what tasks, if any.

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Appendices

Appendix 1: Questionnaire Form

Soft skills Developed by Gaming as a Hobby

Thank you for taking part in this survey exploring the perceived attained competences from gaming as a hobby. The aim of the study is to find out what useful and sought after transferable skills for information work are improved by gaming, and it is mainly focused on professionals who engage in knowledge work. These competences consist of cognitive, motivational and emotional, and social skills. At the start of the survey, some demographical information will be collected about you and your gaming habits. The survey is anonymous and below you will find the Data Protection Agreement for your perusal.

Data Protection Agreement

1. Name of the register

Soft skills of a gamer

2. Data Controller

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4. Purpose and legal basis for the processing of personal data

The research collects data on perceived soft skills attained from gaming with a survey. The survey involves collecting demographical information (age group), habits in gaming (time spent, platform, genre) and perceived attained soft skills.

The legal basis for processing personal data in the Article 6 of the EU General Data Protection Regulation is:

Processing is necessary for scientific research (public interest, Point 1a of the Article 6)

Data subject has given their consent to processing personal data (consent, Point 1e of the Article 6)

Other, what _____

5. Processed personal data

The following information of the data subjects is stored in the register: age group, habits in gaming, perceived attained soft skills.

6. Recipients and recipient groups of personal data

The data will not be transferred or disclosed to parties outside the research group.

7. Information on transferring data to third countries

Personal data will not be disclosed to parties outside the EU or the European Economic Area.

8. Retention period of personal data or criteria for its determination

The survey responses will be leveraged to build data to support the research. Personal data is stored until 31 July 2023, after which the data is disposed of securely.

9. Rights of the data subject

The data subject has the right to access their personal data retained by the the Data Controller, the right to rectification or erasure of data, and the right to restrict or object the processing of data.

The right to erasure is not applied in scientific or historic research purposes in so far as the right to erasure is likely to render impossible or seriously impair the achievement of the objectives of

that processing.

The realisation of the right to erasure is assessed on a case-by-case basis.

The data subject has the right to lodge a complaint with the supervisory authority.

10. Information on the source of personal data

Data is collected from those who answer the survey for the study.

11. Information on the existence of automatic decision-making, including profiling

The data will not be used for automatic decision-making or profiling.

By proceeding to the next page in the survey, you agree to the usage of your personal data as described in the DPA above.

1. Age group

- 18-22
- 22-28
- 28-35
- 35-45
- 45+

2. How much time do you spend playing video games weekly on average?

- 0-2 hours
- 2-7 hours
- 7-14 hours
- 14+ hours

3. What platform/s do you play on?

- PC (Windows, MacOS, Linux etc.)
- Console/Portable console (PlayStation 5, Xbox Series X/S, Nintendo Switch etc.)
- Mobile/Tablet (Android, iOS etc.)

4. Which genre/s of video game/s do you play?

Genre(typical subgenre: *example game*)

- Action & Adventure (platformer, survival: *Super Mario Odyssey, God of War, Legend of Zelda*)
- Arcade & Other (arcade, rhythm, party: *PacMan, Guitar Hero, JackBox*)

- Fighting (2-D fighters, beat'em ups, platform brawlers: *Tekken, Super Smash Bros*)
- Puzzle & Skill (physics game, classical, casino: *Angry Birds, Tetris, Solitaire*)
- Racing & Vehicle Simulation (cars, flight, space: *Forza, Microsoft Flight Simulator, Kerbal Space Program*)
- RPG & Narrative (MMORPG, roguelite, monster tamer: *The Witcher, Hades, Pokémon*)
- Shooter (FPS, vehicle shooter, hero shooter: *Counter Strike, World of Tanks, Overwatch*)
- Simulation (city management, life simulation, other management: *Cities: Skylines, The Sims, Farmville*)
- Sports (sports game, sports management, competitive: *NHL, Football Manager, Rocket League*)
- Strategy (4X, RTS, MOBA: *Civilization, Starcraft, League of Legends*)

What effect has gaming as a hobby had on the development of the following competences in you experience?

5. Cognitive

	None	Unsure	Some	Significant
Focus (the ability to allocate your attention to a single task at hand and reach a flow state)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning (the ability to acquire knowledge through study, experience or being taught)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adaptability (the ability to adjust to new conditions)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Problem solving (the ability to find information, analyze it and utilize critical thinking to decide how to solve complex issues)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attention to detail (the ability to process detailed information effectively and consistently)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creativity (the ability to produce or use original and unusual ideas)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transferable IT skills (the ability to quickly adopt and use new software)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Multitasking (the ability to perform more than one task at the same time)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	None	Unsure	Some	Significant
Strategic thinking (the ability to analyze and understand the big picture, anticipate potential challenges and opportunities, and make informed decisions according to long-term goals)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Motivational and Emotional

	None	Unsure	Some	Significant
Self-confidence (the feeling of trust in one's abilities, qualities, and judgement)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emotion regulation (the ability to modulate an emotion or set of emotions)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning from failure (the ability to gain accurate and useful insights from failures and modify future behaviors)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Motivation (the internal state that helps one initiate, continue, or terminate a behavior)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Persistence/perseverance (continued effort to do or achieve something despite difficulties, failure, or opposition)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Withstanding pressure (the ability to continue doing a task effectively despite opposition or hindrance)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Social

	None	Unsure	Some	Significant
Teamwork (the ability to work effectively and efficiently with a group)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication (oral and written) (the ability to concisely and effectively exchanging information via a chosen medium)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	None	Unsure	Some	Significant
Empathy (the ability to understand and share the feelings of another)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dependability (the ability to be trustworthy and reliable)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Language skills (the ability to communicate in a specific language)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leadership (the ability to lead a group to reach a common goal)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Negotiation (the ability to barter an outcome between two sides with different aims or intentions)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Are there any other competences or soft skills that you feel you have developed from gaming?

Appendix 2: Research data management plan

1. Research data

Research data type	Contains personal details/information*	I will gather/produce the data myself	Someone else has gathered/produced the data	Other notes
Data type 1: <i>Survey</i>		x		

* Personal details/information are all information based on which a person can be identified directly or indirectly, for example by connecting a specific piece of data to another, which makes identification possible. For more information about what data is considered personal go to the [Office of the Finnish Data Protection Ombudsman's website](#)

2. Processing personal data in research

I will prepare a Data Protection Notice** and give it to the research participants before collecting data

The controller** for the personal details is the student themself the university

My data does not contain any personal data

** More information at the university's intranet page, [Data Protection Guideline for Thesis Research](#)

3. Permissions and rights related to the use of data

3.1. Self-collected data

Necessary permissions and how they are acquired:

Data type 1: Respondents agreed to participate in research at the beginning of the survey.

3.2 Data collected by someone else

No data collected by anyone else.

4. Storing the data during the research process

In the university's network drive

In the university-provided Seafile Cloud Service

Other location, please specify: University Webropol Service

5. Documenting the data and metadata

5.1 Data documentation

To document the data, I will use:

A field/research journal

A separate document where I will record the main points of the data, such as changes made, phases of analysis, and significance of variables

A readme file linked to the data that describes the main points of the data

Other, please specify:

5.2 Data arrangement and integrity

I will keep the original data files separate from the data I am using in the research process, so that I can always revert back to the original, if need be.

Version control: I will plan before starting the research how I will name the different data versions and I will adhere to the plan consistently.

I recognise the life span of the data from the beginning of the research and am already prepared for situations, where the data can alter unnoticed, for example while recording, transcribing, downloading, or in data conversions from one file format to another, etc.

5.3 Metadata

I will save my data into an archive or a repository that will take care of the metadata for me.

I will have to create the metadata myself, because the archive/repository where I am uploading the data requires it.

I will not store my data into a public archive/repository, and therefore I will not need to create any metadata.

6. Data after completing the research

I will destroy all data immediately after completion, because:

the most important pieces of data have been summarized in the findings of the research paper.