



The Developing of “STTS – Stick To The Story,” a Serious Game for News Literacy, with the focus on the Marketing Aspects in the Video Game Industry

Ioannis Kostopoulos

SID: 3305180019

SCHOOL OF SCIENCE & TECHNOLOGY

A thesis submitted for the degree of

Master of Science (MSc) in E-Business and Digital Marketing

February 2020

THESSALONIKI – GREECE



INTERNATIONAL
HELLENIC
UNIVERSITY

The Developing of “STTS – Stick To The Story,” a Serious Game for News Literacy, with the focus on the Marketing Aspects in the Video Game Industry

Ioannis Kostopoulos

SID: 3305180019

Supervisor:

Prof. Ioannis Magnisalis

SCHOOL OF SCIENCE & TECHNOLOGY

A thesis submitted for the degree of

Master of Science (MSc) in E-Business and Digital Marketing

February 2020

THESSALONIKI – GREECE

Abstract

Digital Citizens throughout the world currently face a significant and enormous problem regarding fake news, misinformation, and disinformation. Research has shown that false information rise exponentially day by day, primarily through digital media channels. Serious Games can be a beneficial and profitable asset to enrich the educational process of digital citizens through different sectors. This master thesis investigates the usefulness of the implementation and marketing of a serious game and aims to develop a serious indie game in order to teach News Literacy skills and to act as a doctrine against fake news, misinformation, and disinformation. An alpha phase of the serious game was developed, and questionnaires were handed to 45 participants in order to evaluate the effectiveness of a serious game regarding the improvement of News Literacy skills. The analysis conducted showed a substantial increase in News Literacy skills for the participants before and after playing the serious game developed and that there is a great potential in marketing a serious game with the game theme “News Literacy.” In this context, it is recommended that digital citizens should use serious games as a critical factor in order to educate themselves, especially for News Literacy skills. Further research is needed to identify other factors that will be needed to fully develop the serious game in order to be able to define the complete marketing process as well as the publishing of the final state of the game.

Ioannis Kostopoulos

02/02/2020

Table of Contents

Abstract	II
Chapter 1: Introduction	1
Chapter 2. Literature review	4
2.1 Definition of Serious Games and use	4
2.1.1 Digital Games	5
2.1.2 Serious Games	6
2.1.3 Use of Serious Games	7
2.2 Free to Play or Pay to Play?	10
2.3 Developing an Indie Game.....	11
2.4 Why Fake News, Media Literacy and Misinformation can be used as a game theme.....	13
2.4.1 The help of Gamification and Serious Games in different sectors (Education, Science, Politics, Medical, Psychology)	14
2.4.2 Misinformation, Fake News and News Literacy.....	15
2.4.2.1 Fake News	17
2.4.2.2 Misinformation and Disinformation	19
2.4.3 Target Group for a Serious Game for Fake News.....	19
2.5 Art and Design.....	21
2.5.1. Platforms/Engines for Game Development for Serious Games.....	24
2.6 Promoting/Marketing and Developing Games	25
2.6.1 Why Games are Good for Business	25
2.6.2 Marketing in the Video Game Industry	26
2.6.3 Ways of Promoting/Marketing a Game (SEO, Google Ads, Playstore Ads, Instagram Ads, Reddit Ads)	27
2.6.4 How to market a web-based / android serious game	29
2.6.5 Effects of Video Game Streaming.....	30
2.6.6 What is a True Gamer	31
2.7 Research Questions.....	31
Chapter 3: Design and Implementation.....	32
3.1 Unity as the Game Engine	32
3.1.1 Why use Android and WebGL as the build platforms?.....	35
3.2 Design Process of the Serious Game	36
3.2.1 Game Theme.....	36
3.2.2 Logo Creation and Name of the Serious Game	38
3.2.2.1 The Name	38
3.2.2.2 The Logo	39

3.2.3 Aesthetics of the Game	40
3.2.3.1 Home Screen	41
3.2.3.2 Game Modes	41
3.2.3.3 Categories.....	42
3.2.3.4 Multiple-Choice Questions.....	42
3.2.3.5 Completed Stage and Score	43
3.2.3.6 Profile Progression.....	43
3.2.3.7 Settings.....	44
3.3 Gameplay Design and Game Mechanics Design	44
3.4 Content of the Serious Game.....	46
3.4.1 News Literacy	46
3.4.2 How to Spot Fake News.....	51
3.4.3 Types of Bias.....	54
Chapter 4: Possible Publishing and Marketing of “Stick to the Story”	57
Chapter 5: Results.....	62
Chapter 6: Conclusion and Future Work.....	69
Chapter References	71
Appendix	81

Chapter 1: Introduction

The presence of educational games in our lives is not new. The oldest universities have been collecting educational games for almost fifty years. First designed for classroom use, for elementary school students, they revealed a desire to introduce playful, child-specific, school-based methods in education.

With the introduction of the computer in the same medium during the 1970s, the play was diluted in teaching-learning tutorials, considered a priori attractive for students. At the same time, over the last 30 years, the development of video games has been based primarily on the youth (secondary) market and then on the adult market. More recently, the growing popularity of digital games is causing educational circles to reflect on the virtues of such games for teaching and learning. In short, the marked interest of educational circles in the use of strategies games, on the one hand, and the enthusiasm of recent generations of students for video games, on the other hand, has led to the production and use of educational games that are currently grouped under the term of "serious games."

This assignment aims to provide an in-depth analysis of "serious games," their approach in the existing literature as well as to develop a serious game in order to help digital citizens in general to face the problems that can occur through misinformation and fake news. The final serious game can also be used then to measure the results of the outcome. In addition to this, the paper will try to show different marketing channels in the video game industry and which one is ideal to use.

Various researchers question the possibility of learning by playing a serious game, but also about the value of the serious game in pedagogy and its integration into a training and teaching environment (De Freitas and Jarvis, 2007; Kaufman 2010, Squire 2003). Moreover, the design methods of serious games are poorly documented, as well as the precise content of the architectures of serious games systems. Several authors argue that the educational and engaging value of serious games lies in the ability of systems to adapt to the learner's progress (Lopes and Bidarra, 2011, Beaudry et al., 2010, Niehaus and Riedl, 2009). The goal is to design a serious game architecture that allows the automatic generation of gameplay scenarios whose contents adapt directly to the progression of the players-learners while ensuring learning that is both motivating and effective.

It is this ease of access to video games - a profusion of speeches, media, and market availability – that does not help its constitution as an object of science. It is a natural product, a game among others, particularly familiar for all users irrespectively of its application or educational purpose.

In order to meet this objective, we have developed a serious game, whose educational objective is to develop a critical knowledge of combatting fake news. From these probabilities, the adaptation module generates a pedagogical plan that consists of modifying the serious game environment in order to promote learning and to keep the players-learners engaged in their gaming experience (Callies and al., 2015).

It is just as challenging to address the conditions of the creation and use of digital games as well as serious games. The production of video games is a combination of artistic approaches, industrial and commercial logic in a globalized market. Their use seems to be characterized by the diversification of the socio-cultural profiles of the players and the afferent diversity of the ways of playing. The need to include, in the analyzes of video games, their specificity, their contents, and the conditions of their production and use leads to further expanding the fields that are mobilized for their research.

Current analyses are limited by the illusion that the problems of construction of a research object can be treated by multiplication of points of view, while they increase definitions and different methods. Game studies were structured in English-speaking research, less by confronting these difficulties - of definition, of discourse status, of multiplication of approaches and methodology - than by contouring them, sometimes by feeding them. They correspond to a cross-disciplinary field of analysis of video games, practices, and related learning, which results from the convergence of several fields of research.

For the above reasons, the analysis in this assignment will be structured in the following manner. First, in Chapter 2, an in-depth analysis of existing literature concerning digital and serious games will be provided in order to answer questions such concerning the difference between digital and serious games, the use of serious games in various pedagogical fields, the characteristics of indie games, their design methods and ways of promoting. Following the methodology of this assignment is described, with particular emphasis on the research questions that are to be answered in the literature review as well as in the design of the serious game.

Chapter 3 is the practical part of the assignment with the design and implementation of a serious game, with an analysis of the steps, the design process as well as its implementation and the content used for the serious game. Following, Chapter 4 focuses on a future possible release and marketing of the serious game with various methods established in the existing practice and literature.

Finally, the Research questions are answered in Chapter 5, followed by a Conclusion with emphasis on further steps that need to be researched in the literature as well as on the application of the serious game that is designed in this assignment.

Chapter 2. Literature review

Serious Games is a new field in pedagogy and is growing rapidly (Cai and Goei, 2014). Since 2002, research on Serious Games has proliferated, and an association has emerged, such as Sage's "Games And Cultures" and the "Digital Games Research Association" (DiGRA) (Schmoll, 2011). However, data on the educational potential of Serious Games are scarce, and further research is needed in this area as only a few games have been evaluated in empirical research (Argenton, Muzio, Shek, and Mantovani, 2015) for their pedagogic potential.

The scope of this Chapter is to present the literature review concerning the evolution of the term Serious Game, its difference to digital games, and the usages of Serious Games in various fields such as education, media literacy while presenting development and marketing tools. The Chapter concludes with the Research Questions on which this assignment is based in order to further assist researchers in Serious Games.

2.1 Definition of Serious Games and use

For fifty years, the concept of educational games has taken multiple meanings. According to Clark Abt (1970), games are a means of enriching school curricula by reducing the boundary between "school learning" and "informal learning"; a "serious game" can be a computer game, a board game, a role-play or even an outdoor game. The difficulty of a multi-expertise design is based on serious games, on the fact that in addition to engineering specialists, areas to teach, and pedagogy, they also require the intervention of video game specialists. These are for example the game designers, responsible for defining the rules and the operation of the game, or the level designers responsible for the Game design in the different levels that a game entails. Their expertise is related to their primary purpose: to motivate the player to play.

In Graham (1996), an artist suggests that video games can deal with serious subjects such as art and culture. Today, they are related to the computer sector, and there are a lot of terms and expressions: educational game, simulation, virtual reality, edutainment, digital game-based learning, immersive learning simulations, persuasive games, synthetic learning

environments. This multitude of names reflects both the number of actors involved and the diversity of their approaches.

For Benjamin Sawier (2007), a "serious game" is any proper use of technologies from the video game industry for purposes other than mere entertainment. For Julian Alvarez & al (2011), the serious game adds a serious dimension to video games. Finally, for Louise Sauvé, "a serious game is a video game, with a realistic or artificial environment, to which the authors attach an educational component.

The integration or not of the realistic component brings together serious games and simulation games which are defined as a simplified and dynamic model of a real or hypothetical system". Moreover, taking up De Grandmont (2005), she considers that a game that is not used in an educational or pedagogic context remains only a "playful" game. It distinguishes two types of games: the educational game and the pedagogic game. In the educational game, the learning objective is implicit, that is to say, not always expressed, and the pleasure it generates is extrinsic. In the pedagogic game, the learning objective is explicitly identified, and performing is an intrinsic pleasure. Nevertheless, in both cases, the game must contribute to learning.

2.1.1 Digital Games

According to Alvarez and Djaouti (2010), what distinguishes a serious game from a strictly playful video game is the addition of the serious dimension in the game scenario. The field of serious games is relatively recent: several experts on this area of knowledge (Alvarez and Djaouti 2010, Lavigne 2012, Schmoll 2011) set the starting point for serious games, the release of the hit title America's Army in the early 2000s and after Benjamin Sawyer founded 2002an independent organization to promote and develop serious games which were called "The Serious Games Initiative."

As indicated by Alvarez and Djaouti (2010), several Serious Games were realized without the two dimensions being integrated into a coherent scenario. In 1958, Roger Caillois indicates in his writings that the game must be a free and unrestrained activity, which takes place in a determined period, that produces an unexpected result, does not create value, follows its own rules and must be unreal. The rules and principles that were established by Caillois are still used when designing serious modern games (Djaouti, 2011). Clark Abt (1970, quoted by

Alvarez and Djaouti, 2010) defines the term "Serious Games" in his book "Serious Games" and establishes the company "Abt Associates," which develops several simulations and simulation games. Abt had previously worked in the 1960s on the "TEMPER" game of the Raytheon Company, a game designed to train for war games and funded by the US military.

In the late 1990s, Rieber et al. (1996) worked on the role of cognitive load in memory fixation and the role of proximity between message and image in order to improve the understanding of memory interfaces in the design of video games. According to Rieber et al. (1996), to be successful in playing a video game may require critical thinking and even problem-solving. In 1999, it was the release of Sawyer Benjamin's white paper on the use of video utility games. The book is titled "Serious Game: Improving Public Policy with Game-Based Simulations." The term "Serious Games" was added because of the stereotypes conveyed in the American population, namely that the video game is intended for children and that it is not serious for an adult to play (Alvarez and Djaouti, 2010).

In 2000, Keller presented a simplified motivational model that applies when designing a serious video game. The components of Keller's motivation theory are attention, relevance, trust, and satisfaction. These four elements require unforeseen, challenging, and meaningful problem-solving exercises at the beginning of a student-level course (he must believe that he can do so) and, finally, a variety of events of 'learning. To build student confidence, Keller (2000) mentions that students should be told what they are looking for, including the expected learning goals. An environment must be set up where the student feels confident, can make mistakes and start again without being penalized. Keller emphasizes the importance of quick and positive feedback to recognize effort and pleasure in learning (Keller, 2000). Since the 2000s, interest in the field of serious games has increased. Espen Aarseth launched in July 2001, "The international journal of computer game research and finally, in 2002 the release of the hit title "America's Army" and the foundation by Benjamin Sawyer of the independent body to promote and develop serious games with the "The Serious Games Initiative."

2.1.2 Serious Games

There are various definitions concerning the term Serious Game. Following Natkin (2004), in a Serious Game, we have the use of principles and technologies of video games without the sole purpose of fun for its users. The purpose of these games is learning by using the applications of video games as a reward to the users. This combination of learning and

gamification is also evident in the definition proposed by Loh et al. (2015), where a Serious Game is defined as a game where the main objective is not its diversification but the optimization of its learning process with the use of visual contents.

Several experts in the field of knowledge, notably Sauvé et al. (2010a), affirm that it is important to define what is a Serious Game concerning the simulation game. They identified six essential criteria: 1) the player, 2) the conflict, 3) the rules, 4) the purpose of the game, 5) the artificial nature, and 6) the educational character. According to the authors, the artificiality of the game is an essential element since it identifies what a Serious Game is compared to the simulation game that is a more or less detailed representation of reality. Lavigne (2012) supports this statement when he indicates that a simulation game is not a Serious Game since it is a representation of reality. This definition of the game adheres to the rules of Roger Caillois, which specifies that a game must be unreal.

Alvarez and Djaouti (2010) define the serious game as "a computer application, whose initial intention is to combine, coherently, both serious aspects, such as teaching and learning, with fun elements from the video game. An essential element in this process is that of realism. Serious games allow the learning of central or essential elements, without having to be "cluttered" by the more trivial aspects (Crooks and Eucker, 2001) while offering an overview and exploration of different perspectives of the same problem (Christopher, 1999). This "simplification" allows the learner to dwell on certain elements of the model, elements that might have escaped his attention in reality (Apkan 2002). Sanchez et al. (2011) evoke the realism of the game in the sense of its credibility vis-à-vis the real. Some authors, including Christopher (1999) and Sauvé et al. (2010), specify that the reality of the serious game is concretized by the environment in which the player evolves during the game.

2.1.3 Use of Serious Games

Paquette et al. (1997), describes the use of serious games with educational goals. In that aspect, they specify what we want the end-users to have acquired after playing serious games. This approach contains the skills (knowledge, skills, and attitudes), but also the relationships that must exist between them (composition, precedence, etc.)

More specifically, sectors such as the military use serious games both to recruit and train new officers (Michael & Chen, 2005). Companies are also increasingly interested in this

phenomenon, which offers them real opportunities to train their employees (Michael & Chen, 2005). However, one of the areas that have the highest potential to benefit from this new technology is the health sector (Kato, 2010). Serious games have already been used repeatedly at different levels of the healthcare industry.

For healthcare, Serious Games can be used for (a) rehabilitation: their goal is to help individuals during their rehabilitation phase by making the process more enjoyable than the traditional method (Bartolome et al., 2011, Rego et al., 2010), (b) for prevention and education: their goal is to provide an interactive experience that has the potential to influence health professionals: (c) for training: their goal is to assist professionals during their training (Bartolome et al., 2011) enhance their feeling of effectiveness and influence behaviors of the individual related to his state of health (Bartolome et al., 2011).

In sum, for the general public, serious games can be used to raise awareness of general health, safety, or environmental problems. These games are intended to make the player aware of difficulties or general problems. Universities and companies can also use serious games that are able to provide complete and accurate content, depending on the level of the player. The objective is the comprehensive understanding and learning of particular problems to enable learners in training to address and solve complex problems.

Other more specialized uses, such as surgery or piloting, are based on immersion-based games that can allow physically realistic simulations with complete underlying mathematical models, in order to better prepare people to critical cases. Serious Games must, therefore, be designed according to the sector of activity, the public, and the available means (material and financial) for their implementation.

Blackman (2005) provides a synthesis of the game industry and its applications to the general public. The video game is becoming more and more popular today, which leads to significant investments. The means put in place allow the development of tools and databases, facilitating and improving the design of video games. The graphics engines of video games, which are more and more sophisticated, can even be used for applications other than games because they offer real-time rendering and physics management.

Following are some benefits that educational digital games can bring to the teaching and learning process:

- (a) **Motivating effect:** serious games are highly capable of entertaining while encouraging learning through interactive and dynamic environments (Hsiao, 2007). They can arouse interest and motivate students with challenges, curiosity, interaction, and fantasy (Balasubramanian; Wilson, 2006). Digital game technologies provide a rich visual and spatial aesthetic experience and are thus able to seduce players and attract them into fictional worlds that arouse feelings of adventure and pleasure (Mitchell; Savill-Smith, 2004). Having components of pleasure and fun embedded in the study processes is essential because, with the more relaxed student, there is usually greater reception and willingness to learn (Prensky, 2001; Hsiao, 2007). Well-designed games take players into a state of intense concentration and enthusiastic involvement (called the flow state), where the eagerness to win promotes the development of new skills (Mitchell; Savill-Smith, 2004). The goals and challenges that need to be met in games provoke people to keep them motivated and, in some cases, even regain the mood of those who have lost interest in the study (Ritchie; Dodge, 1992).
- (b) **Learning Facilitator:** Serious games have the ability to facilitate learning in various fields of knowledge. They enable the generation of graphics to represent a wide variety of scenarios. For example, they help understanding science and mathematics when it becomes difficult to manipulate and visualize certain concepts, such as molecules, cells, and mathematical graphs (Fabricatore, 2000). Games put the student in the role of decision-maker and expose him to increasing levels of challenges to enable learning through trial and error. Game designers insert the user into a learning environment and then increase the complexity of situations, and as skills improve, player reactions become faster, and decisions are made faster. Many teachers recognize that games, in addition to facilitating the content acquisition, also contribute to the development of a wide variety of strategies that are important for learning, such as problem-solving, deductive reasoning and memorization. Other benefits of games and simulators include improved strategic thinking and insight, improved psychomotor skills, analytical skills development, and computational skills. Some online games, which are played in teams, help to improve the development of group strategies and the practice of cooperative work (Gros, 2003).
- (c) **Development of cognitive skills:** Games promote intellectual development since, in order to overcome challenges, the player must develop strategies and understand how the different elements of the game relate to each other (Gros, 2003). They also

develop a variety of cognitive skills such as problem-solving, decision making, pattern recognition, information processing, creativity, and critical thinking.

- (d) Discovery Learning: They develop the ability to explore, experiment, and collaborate. (Becta, 2001) Because instant feedback and a risk-free environment provoke experimentation and exploration, stimulating curiosity, learning by discovery, and perseverance.
- (e) Experience of new identities: Offer students opportunities for new experiences of immersion in other worlds and to experience different identities. Through this immersion occurs the learning of skills and knowledge associated with the identities of game characters (Hsiao, 2007). Thus, in a game or simulator where the student controls an engineer, doctor, or airplane pilot, he will be facing the problems and dilemmas that are part of these professionals' lives and assimilating content and knowledge related to their activities.
- (f) Socialization: Another advantage of educational games is that they can also serve as socialization agents as they approach student players, competitively or cooperatively, within the virtual world or in the physical environment of a school or university. By networking with other players, students have a chance to share information and experiences, expose game-related issues, and help each other, resulting in a distributed learning context (Hsiao, 2007).
- (g) Movement coordination: Several types of digital games promote the development of motor coordination and spatial skills.
- (h) Expert Behavior: Children and young people who play video games become experts in what the game proposes. This indicates that games with educational challenges may have the potential to make their players' experts on the topics covered.

2.2 Free to Play or Pay to Play?

The videogame business model began with the simple Pay to Play in which the player paid only once to be able to play the game, buying the CD or cartridge and installing it on his computer or console using a password. Even though the business was very profitable, having active internet servers meant developers had a fixed cost that reduced the profit margin over the years. Due to this, a step forward was taken, and games began to be sold with a monthly fee, as

is the case of the famous World of Warcraft, in which, in addition to paying for the game (about € 60) you have to pay € 12 / month to enjoy the servers.

With the arrival of smartphones, it was discovered what is today, a trend in the video game scenario, the F2P (Free-to-Play), since at no cost, the user can download it on the mobile and play, but with extra content or “premium” at a reduced price (between € 0.2 and € 5). An example of this is AngryBirds, produced by the Rovio studio (Finland), which in its free version is subsidized by advertisements, and in its premium version, it charges a meager amount in exchange for removing that advertising on the screen.

Although the figures for benefits in this type of game are not too remarkable with respect to other types of games, they are considered when measured aggregative. There are also F2P games with the possibility of the player to buy optional accessories through so-called micropayments. The clearest example is the game League Of Legends (hereinafter LoL) or World of Tanks, a war game of tanks.

League of Legends was, according to Forbes, the most played in the world in 2012 by a number of hours, with a total of 1,292.5 million hours, doubling the number of the second most played, the World of Warcraft giant, with 622.3 million hours. Thus, seeing the reception of this system in this market, the main rival of Activision-Blizzard, Electronic Arts, included micro-payments in its next installments. The researchers indicate that the reason why these subjects can spend long hours in front of the computer could be related to the sociological need for self-esteem (Colwell, Grady & Rhaiti, 1995) and collective self-esteem (Barker, 2009).

2.3 Developing an Indie Game

In the early years of video games, all games were independent in the sense that there was no established economic or industrial framework, and development was done in isolation. With the growth and profitability of video games, different forms of games emerged, and "dominant" forms of "marginal" forms could be distinguished. Before being called "indie games", alternative or independent games were otherwise called "amateur", "hobbyist", "fan", "shareware", "demoware", "freeware" etc. Sometimes the games were produced for profit but

very often for pleasure. Often these communities were geographically located and organized around specific tools for creating games or programming languages.

The cultural entrepreneur in video games is called "indie," an independent studio. The concept of the "indie" studio of video game development is debated in "game studies" both in substance and in form. On the bottom, it can be an independent studio in the sense that the developer is not remunerated, where the studio does not depend on help or support from a large company, where he has the control of his idea and the total freedom to create and to experiment, where the studio does not have the constraints as strong as to make profitable and to plan the game in an exact and strict way, where the working methods are different from those of Majors (Ruffino, 2013), where it is possible to create a social and cultural identity (Parker, 2013) and to obtain individual recognition. On the form, it refers instead to small company size and a moment in the growth of the company (it's birth): we are an indie startup before becoming a third-party development studio. Finally, the indies explore niches or possibilities that are not exploited by the majors, which also allows them to culturally legitimize games as "art-games" (Parker, 2013).

The development of Indie games is based on budgets of several hundred million dollars, and it is less expensive to maintain its community of players by seeking to retain its successful game than to risk the development of a new game (Bies, 2017). The indies thus bring a variety to the ecosystem for which there is a latent demand. In parallel, the barriers to entry, such as economic and technological, fall in favor of the indies. On the one hand, with the development of the internet, online distribution platforms have been developed on all hardware platforms (PC / Mac, mobile/tablets, consoles).

This has several consequences for the indies: facilitating the contact with its community of players, globally distributes the game cheaper, gaining more visibility, and reducing indie dependence on the majors for the distribution of their games (Wawro, 2018), reach a larger share of revenue (about 70% on PC / Mac platforms and Appstore, Google Play). On the other hand, it is easier today to develop games for an indie either because access to development software is less expensive, open-source or accessible on multiple platforms (Game Maker Studio, Unreal, Unity, and Unity for consoles and mobiles) (Martin & Deuze, 2009), or because developing mobile and tablet game applications, is an easy way for a small indie to enter the market.

Davidovici Nora (2018) further distinguishes three types of indie games for their development:

- (a) Professional indies: These are indies that are created by previously employed in majors developers who had a parallel idea for a game during their employment. In that case, after their employment, they use their accumulated experience in order to develop an Indie game. (e.g., League of Legends)
- (b) Hobby indies: These are indies that are created without the purpose of making profits and are developed in parallel with other activities (such as studies or work). The primary motivation for their development is fun and personal amusement. (e.g., Minecraft)
- (c) Survived indies: These are games that are developed in major developers without acknowledging at the time of the development of their potential success. The developers have already accumulated more or less professional experience and can rely on it to find a "winning" game mechanics that can lead to a hit. Often the game concept is found "by chance." So there is a surprising effect as for indies hobby. On the other hand, with resources being limited, the launch and development strategy is rather clear from the beginning to optimize the budget. (e.g., Angry Birds)

2.4 Why Fake News, Media Literacy and Misinformation can be used as a game theme

Play is essential in the world of children and adults because it brings them into a zone of trust. The game is realized in an area protected from the real, and it allows us to learn by trial and error, without judgment or risk, while having fun. For a Serious Game to be effective, it is necessary to recreate the playful dimension while preserving an unreal environment to put in confidence the users in their learning of new knowledge. Unfortunately, integrating the two dimensions in the same video game represents a colossal challenge. As indicated by Hotte (2016), the complexity of the design of a Serious Game is presented during the integration of educational content in the scenario of the game.

The challenge is to create an exciting game from the playful point of view, and that allows a transfer of relevant and useful knowledge. Serious play is not perceived by all

stakeholders as a serious activity, but rather as a hobby that does not have to produce value (Djaouti, 2011). According to them, we play in a specific space-time, to relax and to get out of our daily lives. However, several research and literature have demonstrated the benefits of Serious Games for learning in general, and have recognized them as a form of so-called active learning that is recognized as more effective than a passive method (Argenton et al., 2015; Sauvé, Renaud and Kaufman, 2010b, Tobias and Fletcher, 2012).

Serious Games can improve a person's cognitive abilities and knowledge transfer, solicit prior knowledge, observation and concentration skills, increase organizational skills, integrate concepts, and improve problem-solving skills (Sauvé et al. 2010b). However, serious game designers must incorporate the characteristics that influence learning and integrate them into serious games (Sauvé, 2010). According to this author, games promote metacognitive strategies, and he highlights that repetition improves skills and retention of learning. In addition, it is necessary to use positive reinforcement during feedback as it brings a feeling of well-being and satisfaction. Sauvé (2010) also indicates the importance of content splitting by gradually incorporating the level of exercises. Sauvé's research (2010) reaches the same conclusion as Moreno's research on cognitive strategies (2006), namely that when one begins learning a new field, it is challenging to regularize the flow of new knowledge. Sauvé (2010) also compares the importance of fun in the game as well as competition and the challenge that fosters intrinsic motivation and, indeed, even learning.

2.4.1 The help of Gamification and Serious Games in different sectors (Education, Science, Politics, Medical, Psychology)

The gamification, according to Zichermann and Cunningham (2011), is the application of game mechanics in a system that is not a game. For example, a sports app may use medals and a scoring system to motivate its users. However, in this case, gamification is only a tool to increase the retention of users and not that of proposing an alternative by the game. The distinction must be made because the reflection is different and does not arise in the same context. To illustrate this point, Loh et al. (2015) give examples of problems specific to games.

For example, the games take place in real-time, so an excellent serious game should react at the same time as the player plays and not only at the end of the game asynchronously. Similarly, a game generates different telemetries of conventional software. The game can measure all the player's interactions with the game, but there are still some models to be found

that fully utilize all the player's tracks. Despite the points raised by Loh et al. (2015), most learning analysis techniques can be applied to a serious game. However, these techniques often focus on the "educational" part of the software, leaving aside the playful aspect.

2.4.2 Misinformation, Fake News and News Literacy

The video game is above all a spatial device of the staging of the information, and, in this sense, it breaks with the regime of the linearity of the writing and the simultaneity of the oral. A video game level is paced more than it is viewed or read. Thus, the particularity of video games is to propose experiments, in a set of rules and computer procedures, organized according to a particular architecture with which and within which the player evolves. The mode of transmission of knowledge is then based on the arrangement of the elements, in that the player manipulates objects (characters, sets), but also documents (texts, sound, video). On the basis of this observation, some authors have pointed out that video games are interesting devices for learning differently (Gee, 2003), notably through the trial-and-error logic and the proposed "designated experiment" (Squire, 2006). Of course, far from devoting the omnipotence of the object, the social dimension has been underlined as determining, because without an intermediary, without interpreter which makes sense of the experience, it is difficult to capitalize on the acquired knowledge (Linderoth, 2010), that this either on past games or serious games.

As a result, "news games" use the rhetorical specifics of video games to bring news into play. Based on the simulation, they offer above all an experience of a system, more or less complicated. By modeling procedures, establishing causal relationships, it is then possible to describe with a video game an economic or social system. Backed by a background journalistic work, these games are another way of describing mechanics that may be more difficult to understand in a traditional article.

Although games are designed for information purposes, their educational potential implies a lot of work to support them, in order to think about the game in a broader way, inviting alternative teaching forms such as situated learning, that is to say, the game in and around the game. Thus, it is not surprising that these games are generally accompanied by educational resources (explanatory leaflets, reports) to prolong the discussion. Indeed, as noted by Miguel Sicart, news games may have a central virtue: that of engaging the debate (Sicart, 2008).

Over time, lots of attempts have been made to expand the horizon of literacy outside its well-known application to the medium of writing. Margaret Spencer, in 1986 introduced the notion “emergent literacies” to explain media-related play in young children (Spencer, 1986). Supporters of studies that focus mainly on News Literacy issues have created the concept of multi-literacies, making references to the social diversity of contemporary forms of news literacy. These references stretch to the point that new communication ways need new types of communicative and cultural competence (Cope and Kalantzis, 2000). There is no denying that traditional ideas about literacy have been based on reading and writing, which is the capacity to understand, exchange, and develop meaning via text, speech and any other forms of language, a similar study to this is the media literacy. Media literacy extended the view of literacy to diverse forms of media, ranging from music and images to movies and adverts (Zimmerman). However, it is crucial to note that media literacy differs from news literacy. While media literacy emphasizes the effect of media messages on individuals and the community at large, News literacy pays more attention to the role of the press in society. The ability to judge News literacy is a way of describing, interpreting, and evaluating news, and it has been considered as one that presents new associations or attributes a new meaning to the original communicative act. News literacy can be defined as the capacity of an individual to make use of and to evaluate the source of news information critically, thus assessing the credibility of the information (Schneider and Klurfeld, 2008).

It is the attainment of critical thinking skills for judging and analyzing the credibility of various information and news, thereby distinguishing among facts, opinions, and ideas gotten from the media. In today’s world, news and information reach people in many formats which include but not limited to print media, broadcast media, internet media, and social media, the bulkiness of this news tend to increase exponentially. This increase makes it essential for individuals to acquire this News literacy skills to differentiate between fact and opinion in this wealth of information. In a more democratic environment, well-versed decision making necessitates that individuals develop news literacy skills (F.N, 2019).

News literacy is one that is fixed in the aspect of instant information, interaction on a global basis, and messages created on multiple media platforms. News literacy does not only refer to the analysis of the messages but the awareness of the reason why those messages should exist. It also helps to encourage a critical stand towards the acceptance of news and information. One does not become a media literate because one produces media, but the application of

critical thinking to the production of news makes one a news literate (Jolls, 2012). Therefore, Acquiring News literacy skills enable one to estimate, examine, and compare critically a piece of information received before it is being accepted.

Dialogues and deliberations over misinformation, disinformation, and fake news have revitalized the interest of many in news literacy. Ranging from educators to technology companies, believe is spread that raising news literacy would ensure that people will be able to identify the differences between facts and fiction, which in turn limit the spread of wrong and untrue information, leaving them with a better understanding to sail across partisan media environments (Boyd, 2018; Fletcher, 2019).

2.4.2.1 Fake News

In a more straightforward meaning, fake news is one that has no basis in fact but is presented as being factual accurate (Allcott and Gentzkow, 2017). It is a form of news created to intentionally cause disinformation or hoaxes usually spread through social media or news media in print and broadcast (Tufekci, 2018). The news is then often echoed as misinformation in social media, but it sometimes finds its way to the mainstream media as well (Himma-Kadakas, 2017). The primary purpose or intent for writing and publishing fake news is to mislead individuals or the society at large with an attempt to damage a person, group, or agency for political or financial gain. This act is carried out by using dishonest, outright, or sensationalist headlines to increase its audience (Hunt, 2016).

Fake news has been in existence way back. However, it is a hot topic in recent years. In the past years, news and information are gotten from trusted sources, media outlets, and journalists that are mandated to oblige strict codes of practices. Nonetheless, the internet has permitted a whole new way to broadcast, share, and accept information and news that have little regulation or editorial standards (Webwise, 2019). It has become a new culture for many to get news online from social media sites and networks, which is often hard to tell whether stories are credible or not. The overload of information and a low level of understanding of how the internet works by people has contributed to an uprising in the spread of fake news and hoax stories.

There are many forms which fake news might appear, and people's opinion differs when it comes to identifying what fake news is. Various types of misleading or fake news, as explained by Webwise (2019) include:

- (a) Click baits: Click baits are stories that are written intentionally to attract more website visitors and also to increase advertising revenue for websites. These type of stories makes use of sensationalist headlines to get the attention of people to the website, thus getting click-throughs to the publisher's website. This action is customarily done at the expense of truth or accuracy.
- (b) Propaganda: Propaganda is a piece of information that is mainly used to sway an audience, which may not be objective and may be presenting facts selectively to inspire a particular synthesis or perception (Smith, 2016). These stories are created intentionally to promote a partial point of view or specific political cause or agenda, thus misleading the audience.
- (c) Satire or Parody: This type of fake news is published by social media account handlers and some websites for entertainment purposes.
- (d) Misleading Headings: Those are news that quickly spread on social platforms where only the headlines and small snippets of the total article are shown on audience newsfeeds. They are not false, and it involves distorting stories using a misleading or sensationalist headline. The more a story gets clicked, the more money being generated for the online publisher.
- (e) Sloppy Journalism: Many, at times, reporters or journalists might not check all the facts of a story before publishing it. By so doing, some stories with unreliable information can be printed and published, thus, misleading the audience.
- (f) Biased or Slanted News: This news is false news that tends to attract the audience based on their beliefs or biases.

With the existence of so many fake news, there are several things to watch out for when assessing content online. When evaluating a report, one should take a closer look at the story source, look beyond headlines and checking the entire article, check other sources, facts, and individual biases.

2.4.2.2 Misinformation and Disinformation

Misinformation is generally regarded as a piece of information that is false or inaccurate; it ranges from false rumors, pranks, and insult (Woolley and Howard, 2016). It can also be in the form of news parody or satire if it is taken seriously as if it were true. Misinformation is spread for several reasons, some of which are not the result of an effort to mislead but of carelessness, cognitive bias, or pressures due to social and work activities. Disinformation, on the other hand, is false information that is spread deliberately to deceive the audience (Bittman, 1985). Where misinformation means inaccuracies that arise from error or not being careful enough, disinformation is an intentional falsehood that is disseminated by design (Jowett and O'Donnell, 2005). However, disinformation can be defined from misinformation when known misinformation is purposefully and intentionally spread (Golbeck, 2008).

In summary, to better understand the two terms, misinformation is false information. Still, it might be believed by the person who publishes it in either good faith, bad faith, or with a goal in mind that is politically related but is believed to be accurate at the same time. Disinformation is false information, and the publisher knows that it is wrong.

2.4.3 Target Group for a Serious Game for Fake News

To understand how the "serious games" market is developing, it may be interesting to make distinctions in the purposes of these games to understand the structuring of the market. There are seven categories of serious games according to their general objectives:

- (a) The fun-educative, regrouping the games for informative aim, educational and to promote creativity
- (b) The health-informative. Some games can be used to educate the general public about specific practices that benefit their health. Others can address illness-affected patients, prepare them for treatment, and get their loved ones to understand the causes and effects of a disease. Alternatively, some games can be used for the training of caregivers.
- (c) Playful awareness campaigns. Some games are proposed to develop new behaviors among players (collaboration rather than competition, responsible consumption,

non-violence, humanitarian missions) or other worldviews (social solidarity, pacifism, a fair economy)

- (d) Games training for practicing sports or artistic movements, or simply for the use of a machine.
- (e) Simulations are allowing us to study a phenomenon from a reproduction of a real system. Develop skills adapted to certain tasks: customer service, job search.
- (f) The research games allow the scientific community to collaborate a certain community of amateurs in their research, in areas such as astronomy, sociology, biology.

From the above, we consider that a serious game aimed to combat fake news would be included in the playful awareness campaigns. The reasons for the above are the following:

- (a) Fake news as a phenomenon has various overlapping motivations that can be political, subversive, financial, or entertainment. Therefore, a continuous campaign with no specific time limits can address the issue by exchanging information in the education process between the involved actors and recipients of the game.
- (b) Fake news is amplified by the use of internet platforms, social media, and in many cases Artificial Intelligence (bots). Therefore, the creators of fake news, in many cases, cannot be easily distinguished. This creates a serious problem in the identification of the aim of education. For example, a serious game aimed at the learning of a machine or a sport has a specific aim that is not evident in fake news.

Therefore, the target groups of a serious game for fake news can be the following media literacy and educational methods (Mele et al., 2017):

- (a) Social media users: This target group can distinguish fake news with the use of a serious game along with fact-checking sites. This also relies on the voluntary efforts of the users when identifying fake news on social media (Bode & Vraga, 2015; Wood & Porter, 2019).
- (b) Information providers (Jang et al., 2018): The role of social media platforms is imperative in combatting fake news since, on many occasions, fake news is spread in these platforms without the knowledge of the providers. A serious game on fake news can be distributed in these platforms for the education of both the users as well as the employees of the platform.

2.5 Art and Design

A Serious Game`s design is complex, which makes them expensive to develop, and as they meet the needs of specific groups, they are difficult to make profits. The personalization of a serious game by changing the behavior of the player is one of the major challenges in the field. Serious games research is a multidisciplinary field of study, young and developing. It encompasses several disciplines, such as the arts, humanities, social sciences, psychology, design, computer science, engineering, project management, and so on. This diversity is part of its strength, but also one of its challenges. Customers expect Serious Games to be the same quality as successful commercial video games (with development budgets of at least \$ 1.5 million)but spending ten times less. The reality is that the design of Serious Games is based on low budgets for their development and is generally of poor quality (Göbel et al., 2016).

Considering the design process, a participative approach is necessary (Muller, 2003). This approach is entirely in line with the problem of multi-expertise design in general, and in particular, with serious games, as it aims to bring together designers from different backgrounds and skills at the same time.

It, therefore, involves the establishment of models and design tools that can be understood by all, even if they are approached differently and serve as an interface between the vocabularies, skills, and communities of experts (Caron, 2007; Bowker & Star, 1999). They are used to transform the fact that experts have different knowledge that eventually overlaps, the symmetry of ignorance or asymmetry of knowledge (Fischer, 2000), in operational and shared knowledge, the symmetry of knowledge (Muller, 2003).

Participatory design is essentially concerned with the initial phases of conception, yet (Rabardel, 1995) shows that the appropriation of artifacts, or instrumental genesis, is also an active phase of user participation, after the initial conception. He defines instrumentalization as the fact that users modify artifacts to suit their needs and instrumentation as the fact that the user himself modifies himself by learning to master the artifact.

In that aspect, the meta-design in serious games presupposes collaboration between all users, which implies setting up a specific socio-technical framework and therefore formalizing the different classes of engineering and design. This approach has been used mainly to define models and tools that allow the teacher and trainer users to integrate effectively during the initial

design phases and to enable them to understand and to adopt serious games to their pedagogical contexts.

From an IT perspective, participatory design and meta-design approaches involve the development of conceptual frameworks and models that can serve as boundary objects and also the development of authoring tools that operationalize these models.

The scientific literature on design confirms that one of the main issues in the design of serious games is to get experts to collaborate on different skills and also on goals that sometimes seem opposite (Mehm, 2010; Mariais, 2012; Marfisi-Schottman et al., 2010). The difficulty of conception in serious games is therefore, in the oscillation between the two categories of expertise, playful and pedagogical: on the one hand, a design only carried by pedagogical experts should give to a serious game good teaching skills, but that may not be very fun. On the other side, a design only worn by playful experts could design a very motivating serious game, but whose pedagogical qualities might leave something to be desired. In these two extreme cases, the dual purpose of the serious game of teaching and motivating may not be achieved.

An in-depth study of the software authors' tools allowing to make serious games (Djaouti, 2011) shows that they do not answer the above questions because they have few methodological qualities: the conception of a tool allowing at the same time of designing and making a serious game still seems utopian. Djaouti (2011) show that the authoring tools that make it possible to produce serious games are either very simplistic, allowing only to adapt pre-existing games by modifying some parameters.

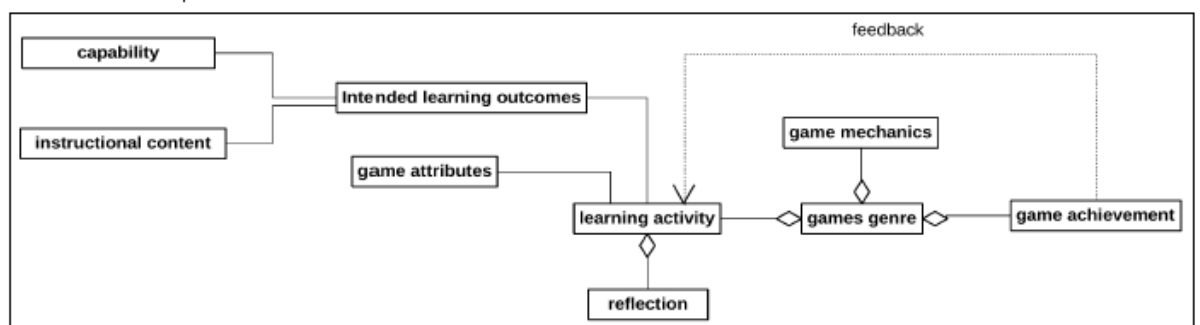
On the contrary, they are more flexible, making it possible to generate more varied games, but requiring the users a minimum, but nonetheless widespread knowledge of programming principles. For example, authoring tools capable of generating games (e.g., Multimedia Fusion Creator, Construct, Game Maker, Scratch, etc.) and serious games (e.g., eAdventure / WEEV, StoryTec, etc.) do not allow their users to identify the main problems of the design, nor their most known solutions.

They do not guide the authors towards particular tasks based on their progress in the design phases. Also, they do not help them to understand aspects of which they are not experts and rarely allow collaborative work and the pooling/reuse of design elements. Thus, these

author tools did not allow to help the designer teachers to build a scenario integrating both pedagogical aspects and playful aspects.

Djaouti (2011) proposes a global model of serious game design called DICE, incorporating some of these steps. A first definition step corresponds to the analysis step which initiates a development cycle whose iterations comprise three rather generic stages in engineering: Imagine, Create and Evaluate

In relation to these works, Serious Game Conceptual Framework is a conceptual framework dedicated to serious games proposed by Yusoff et al., 2009. Firstly, the competences sought to make it possible to define educational objectives with which game attributes are associated. These attributes are designed on the basis of the pedagogical literature and the learning mechanisms applied to video games.



This aspect is specified by Capdevila Ibáñez et al., (2009), which present a conceptual framework enriched by knowledge management based on the experience of the development of the serious game Starbank2. According to Yusoff et al. (2009), Capdevila Ibáñez et al., (2009) this is how the learning activity is defined. The elements of playability can be integrated there through cognitive modeling, also allowing to define the kind of the game. According to [Yusoff et al., 2009], during these learning activities, means and times must be provided to allow a metacognition activity, allowing the learner-player to take a step back to reflect on what he or she accomplished and what remains to be accomplished. This set formed by the learning activity, the game mechanics and the metacognition of the learner-player determine the kind of game to be conceived.

Last, Marfisi-Schottman (2012) also proposes a cooperative approach, that is to say, dividing the work between the different experts' thanks to an authoring tool that formalizes a certain tightness in the functions of each one.

2.5.1. Platforms/Engines for Game Development for Serious Games

The development of mobile platforms has enabled the development of social games, targeting new customers. Online social games, to share its experience (scores, challenges, etc.) with its network, accounted for 13% of the global video game market in 2012 and should reach 18% of the market in 2015, predicted IDATE, a company specializing in the digital economy. Sally-Ann Moore, the director of the e-learning Forum in Paris in 2012, highlighted the impact of the growth of "mobile learning" on the serious games market. In 2012, it was expected that the global market for e-learning products and services would exceed \$ 50 billion in 2015, and that same year, simulated learning revenues would be seven times higher than those based on simulation. One of the most important factors in this growth is the use of learners of mobile devices and tablets. The market for mobile learning games is expected to reach nearly \$ 240 million by 2015.

For developing purposes, Unity3D is a development environment programmed in C# for the production of 2D and 3D video games. It makes it possible to create applications for practically all PC platforms, tablets, telephones, and even game consoles. It is programming by components. The programmer has a scene and different types of "Game Objects," which are preprogrammed basic forms (cubes, sphere, etc.).

Each GameObject itself results from an assembly of components that endow it with specific properties according to what is desired for its operation. The programmer also has a gallery of "Assets." Assets are more complex elements including graphics, animations, and operational source codes, and available for use in a project (many are free, accessible on the internet, and there is a large Asset market). The programmer starts by defining the GameObjects he needs and assembles them on the stage. Then it programs their behaviors, that is to say, everything that in the scenario of the game connects them and is at the base of the course of the game.

The programming of behaviors and actions essentially uses the C # language (a C ++ dialect generally considered "very elegant"). Possibly one can also use the javascript language. By default, Unity3D integrates the development environment and the free Monodevelop compiler. It is also possible to use Microsoft Visual Studio, which is extremely powerful and freely available in its Community version 2015 or 2017. Unity3D offers several licenses, one of which is available free of charge.

2.6 Promoting/Marketing and Developing Games

When examining serious games, due to the combination of the fun and educative sides, as well as the fact that most of the developers are either independent or belong to small companies, we can differentiate between marketing, which is internal and external. In both cases, the goal of the marketing strategy is to create value for the product depending on its final users.

Berry et al. (1976) contributed to the introduction of the concept, and their contributions have served as a theoretical basis for the description and development of marketing techniques applied to employees. Internal marketing has been considered a solution to increase performance and improve service quality. It arises from considering employees as internal customers and recognizes the importance of satisfying their needs (Lewis, 1989). IMO can create a competitive advantage by improving employee engagement (Lings & Greenley, 2005), their greater job satisfaction (Gounaris, 2008), and that must correspond to an increase in market share and benefits compared to competitors (Lings & Greenley, 2009).

2.6.1 Why Games are Good for Business

Serious games contribute to attracting a new clientele, even heterogeneous, ranging from the military to those needing medical care, through the elderly and environmentalists, including businesses. Serious games are most often distributed in the form of free software, downloadable, or directly activatable online. In addition, in many sectors, the budgets allocated to the production of serious games are limited, and the quality is not always high, in comparison with commercial games. Thus, the budgets range from 1,000 to half a million dollars. Some titles exceed several million dollars. The distribution is made from two sources: computer equipment manufacturers and software publishers. Equipment manufacturers (Sony, Nintendo, Microsoft) develop games according to the configuration of their machines to maintain the exclusivity of the machine-software duo and retain their customers during improvements. On the other hand, ISVs offer versions adapted to the various IT platforms in use by the general public.

The market for electronic games has grown considerably over the last fifteen years. It has gone from arcades to individual devices (computers, consoles) and mobile devices (cellular and tablets). But the market for simple electronic games has, in recent years, reached saturation

due to the limited time that is normally given to "play" as a "game" in our societies. However, while some games may be suitable for education and/or training, their practice may be integrated with the time usually given to educational activities; the development of "serious games" is also part of this logic.

2.6.2 Marketing in the Video Game Industry

Today, the definition and differences of "web marketing" or "digital marketing" is obscure to many people, The idea most commonly conveyed is that which consists in thinking that usage of the internet, via website and/or social networks, is enough to be able to claim an expertise - or at least an experience - in web marketing.

However, if it were enough to have a site, a blog, or a Facebook page for "web marketer," all the sites would be swooned by a bewildering number of visitors. In fact, however, most of the 4.65 billion websites counted on the web are buried in the dark abysses of the Google ranking. We can, therefore, deduce that digital marketing expresses the combination of traditional marketing techniques, statistics, trade, communication, with the new information technologies (computer and telecommunications) and multimedia (video, photo, infographics).

Everything fits into a given user interface (website, blog, social networks, emails) with the first and ultimate goal of conquering and retaining users. In reality, the distinction is often geographical in nature.

Marketing in the video game industry has received little research by academics. The reason for that is that this market is crowded because of the availability of tools and resources to all users to produce their own games as well as the strong competition between independent developers and major studios. This has led to an imbalance between the number of new games produced on a weekly basis and the amount of money spent on marketing, which remains relatively stable.

Innovation in marketing includes the use of influencers, owners of games that present them on social media channels such as Youtube. According to Google (2016), 90% of gamers watch a Youtube gaming channel at least once a week, and 64% download a game after seeing it on Youtube. This has led to a big diversification of marketing spending for companies without; however, being able to gather data since marketing relies on individuals-users.

2.6.3 Ways of Promoting/Marketing a Game (SEO, Google Ads, Playstore Ads, Instagram Ads, Reddit Ads)

The challenges of SEO are in fact, its ability to generate targeted traffic from search engines and improve business performance (sales, loyalty, reviews, etc.) (Isckia, 1999, Haon, Patel, 2011). In this perspective, the SEO consists of defining a strategy and applying optimization techniques of so-called "natural" or "organic" referencing. These strategy and optimization actions concern criteria (technical, editorial, transversal) that affect the site, the page, or the links.

The basic job of the SEO is to optimize the indexing of sites or content because the stake is simple: no indexing, no possible presence in the result pages. Indexing is to facilitate the crawl of the pages of the site by search engine robots. One of the major e-marketing challenges of SEO is to better understand the information search behaviors of Internet users on the Web in general and search engines in particular, which are constantly evolving.

Numerous scientific researches mainly on the information behavior of young people and in the fields of teaching and research indicate that a search engine is to be considered as "a global system in which multiple variables come into play: the cognitive space actors, psychological, social and organizational contextual characteristics, as well as changes in information needs"(Ihadjadene, Chaudiron, 2008). The improvement in the display of results, the introduction of Google Suggest, a semi-automatic query capture service, suggesting related queries that are either the most popular, personalized or universal search, has led to more precise research, marked by the ideology of relevance conveyed by Google (Cardon, 2013).

A search engine like Google integrates different indexes and requires specific actions for an index like news. Indexing problems can arise, especially for sites with significant levels of depth of the tree or using techniques or languages with referencing (including javascript, ajax, flash, badly coded forms, etc.). Top-level fixes such as the proposal of a sitemap file (an XML file that provides a sitemap) can partially solve this problem.

From a strategic point of view, the choice of keywords to be positioned must consider the law of the statistical distribution of the long tail. The long tail refers to all the keywords that are not often typed to reach a website, but the cumulative of which represents a large part of the total traffic of this site. The choice of keywords can also take into account research trends that

integrate the changes in research over a given period or the principles of the seasonality of the activity, well known in many professional sectors.

Using a tool like Google Trends, it is possible to detect trends or new features and thus anticipate search spikes on specific keywords. All this work must be tracked and modified with the aid of a tool for tracking positioning and measuring competition. In this field, no technique guarantees permanent positioning. The effort to be put in place and the results depend very much on the sector of activity, the competitive intensity of the market, and the type of competitors present (national/international, SME / large groups, etc.). An error during the initial analysis can be extremely expensive because it launches the optimization on a false track. This keyword analysis then becomes recurrent and also participates in SEO.

Considering the use of Ads, it is noted that a game can be paid (premium), free at first then pay (try and buy), paying with subsequent purchase options (paidmium), free and funded only by advertising (free with ads), or free with purchase options (freemium). Of all these possibilities, freemium triumphs. It accounts for 96% of revenue on the App Store, and 98% on the Google Play Store.

In general, the job of a video game publisher is similar to that of a media that has to monetize its audiences, like a free television channel that, besides advertising, offers teleshopping or other surcharged SMS. The game must offer the user experience of both progression and frustration, in which the purchase of options is viewed favorably. In Fifa, for example, it will be to customize the player`s jersey or to recruit star footballers in his team. Some players are happy to pay in a game and are even ready to start again. Once they have paid 99 cents, they are bound to the game and willing to spend more to enrich their experience.

The marketing of paid products differs radically from that of free games or freemium. It requires less analysis of players' behavior but must rely on press relations, knowing how to launch the game at the right time and match it with a massive communication strategy. In the traditional model of the video game industry, which continues for the non-digital offer (sold on CD, for example), a publisher creates a product in-house or uses an external developer, then addresses himself to a distributor who deals with retailers. Classically, 30 to 40% of the turnover of this game will be realized during Christmas week. The strong seasonality of the market and the presence of intermediaries are constraints for new entrants. Publishers must be able to

network and deploy important marketing tools. According to this scheme, the developer retains 10% of the value, the rest benefiting the distribution circuit.

Today, with the digital sales channel dominated by Apple and Google, the developer and publisher capture 60 to 70% of revenue, and the download platform 30 to 40%. In theory, any developer can offer his products on these interfaces. In fact, however, the offer is so bloated that everyone does not have a chance. Without a strong brand or a truly innovative product, it is impossible to survive.

Considering social phenomena, such as gamers` fora and meetings, companies are aware of these and are integrating them into their marketing strategies. As a result, hundreds of world tournaments, mass conventions such as LAN Parties, Cosplay events have been organized in which attendees dress up as their favorite video game, comic or series character, not to mention the multiple business models that emerged in parallel to all this, as it is the case of the companies in charge of organizing the leagues, the companies that are dedicated to streams, both important events and professional and amateur players.

2.6.4 How to market a web-based / android serious game

A serious game is one created for a different primary purpose other than pure entertainment (Djaouti *et al.*, 2015). It is a subtype of a serious storytelling game where the storytelling is useful outside the context of entertainment (Lugmayr *et al.*, 2016). It could be used by industries like scientific exploration, health care, defense, politics, and other related fields. Generally, there are two main drivers for serious games, which are skill argumentation and behavioral changes (Lieberman, 1997).

Marketing a serious game is not as easy as other entertainment games as those often get away with a fictional representation of the physical environment, as well as imprecise input devices. The serious game must have a higher degree of visual, olfactory, tactile, or other-sensory realism than what other commodity games provide. For proper marketing of a serious game, it must have to tie to real-life equipment that is in existence to bring about higher and faster knowledge and experience transfer, thus stimulating the interests of buyers. Serious games must be able to contend with the appeal and experience of other entertainment games without having additional limitations. It should have the required interface to capture and measure the several facets of people`s gameplay that document a player`s progress towards the

aim of the game. The availability of this data serves as a prerequisite towards its improvement and further document the business viability of serious games to various stakeholders.

To increase the influence of serious games in the market, it should be more concerned with creating an accurate model of the player than the other traditional games. This precise model is useful to better tailor the gaming experience to the player's preferences and needs. Although all these require a high level of artificial intelligence, these factors should not, thereby, increase the cost of developing a serious game. An increase in the price of developing a serious game poses a risk for serious games to remain in the academic field, struggling to prove its viability, thus narrowed to only scientific researches.

2.6.5 Effects of Video Game Streaming

It is not uncommon to find professional players online training with their equipment while broadcasting it live online (streaming), with about 2,000 viewers. The streaming is done in a personalized way, with a camera recording the player, audio, and video of the game along with that of the whole team. In addition, there is a direct relationship with the people who are following the video, and the professional player himself interacts with the chat that incorporates the relay system itself.

This contemporary phenomenon (Taylor, 2012) is getting a growing impact on the whole world, although mainly in Asia and Europe, where tournaments can get to collect more than one million live viewers and a huge number of followers. So much so, that in Korea it is broadcast on television through two 24-hour channels to millions of viewers.

Cesar and Geerts (2011) refer to these new media devices as "social television." Among them, "streaming is an extremely interesting context for participatory online media [...] that has put the traditional consumer in the role of a content creator" (Sjöblom and Hamari, 2016). Streaming, as we understand it as a cultural activity, differs from other forms of online video content dissemination by its high level of interaction, which makes it a complete communication channel (Sjöblom and Hamari, 2016). This method allows the viewers (a term generally used to designate the spectators of streamings) to interact with each other but sometimes with the creators of content, and this, often in real-time (the case of live streaming).

2.6.6 What is a True Gamer

In order to define the identification process in the game, we would first have to delimit it precisely as a process, of which the first step is the moment when the user recognizes an element of the visual composition as a manifestation of his self (when seeing the character and check that he obeys the commands he sends him, he recognizes him as the element of visual composition over which he has control). The term avatar is regularly used to name that element (Wagoner, 2009). The original meaning of the term avatar as an incarnation of a deity in the earthly plane (Partridge, 2005), hints at the reason for the adoption of the term in the electronic sphere: the factor of representation of an external will to the alternative universe. Considering the above, a true gamer has identified himself as such and has a series of characteristics that define him compared to other gamers. These are:

- (a) He identifies himself as a member of a community that is connected to a game by introducing the game culture to his personal life.
- (b) He may proceed to the exclusion of other gamers in the community by using gender or racial stereotypes (Ledbetter & Kuznekoff, 2002).
- (c) They spend more time playing a game than others that do not identify themselves as gamers.

2.7 Research Questions

Based on the above literature presentation, this assignment aspires to offer answers to the following research questions:

RQ1. What Platform/Framework/Engine to use to implement a free Mobile Game?

RQ2. How can we implement a gamified experience for free with a focus for educational purposes (for example, a game to teach digital citizens about Fake News and Misinformation)?

RQ3. How to Marketing a Serious Game?

RQ4. Is there an improvement in News Literacy while playing a serious game?

Chapter 3: Design and Implementation

The scope of this chapter is to present the design and implementation of the serious game developed for this thesis with a focus on the term “serious game,” its design process, the game mechanics, and the implementation of content. Furthermore, the chapter shows what else is needed to create a serious game from scratch, such aspects like the name and the logo of the game. The chapter concludes with an alpha phase of the serious game that will be built for Android and on WebGL basis and will be available on a Wordpress website to download and ready to play. Further development is a need to release it. In addition, the serious game will be handed with questionnaires to participants to track the usefulness of a serious game regarding news literacy.

3.1 Unity as the Game Engine

“A game engine is the software that provides game creators with the necessary set of features to build games quickly and efficiently” (Unity)

Unity is a runtime and development environment for games (game engine) of the company Unity Technologies with headquarters in San Francisco. In addition to PCs, target platforms are game consoles, mobile devices, and web browsers. The development environment, which enables the development of computer games and other interactive 3D graphics applications, is available for Windows, Linux (beta only) and macOS.

The development environment (Unity Editor) is based on common 3D animation programs. The main window shows the 3D scene. Various menus and forms allow the camera and scene to be manipulated. Parts of the scene can be selected, scaled, moved and rotated with the mouse. The scene is organized as a scene graph from the so-called “GameObjects.” Components (materials, sounds, physical properties, scripts) can be assigned to these GameObjects. Simple objects such as light sources or graphic primitives (levels, cubes, and spheres) can be created directly in the editor. Complex components (so-called “assets”) are imported via drag & drop, 3D models, animations, textures, and sounds created in other programs. If they are changed during production, then the Unity Editor updates them

automatically. The “Game View” simulates the graphical representation and behavior of the game. An export function enables the creation of executable applications. (Unity)

Unity allows the development of games and applications for the following platforms:

(a) PC operating systems

- Windows
- Windows Store Apps
- macOS
- Linux

(b) Game Consoles

- Nintendo Switch, Nintendo New 3DS, Nintendo Wii U
- PlayStation 3&4 and PS Vita
- Xbox One, Xbox 360

(c) Mobile Operating Systems

- iOS
- Android
- Blackberry 10
- Windows Phone 8
- PlayStations Mobile

(d) Web Browser

- WebGL
- Unity Webplayer Plugin
- Different Browsers: Firefox, Safari, Chrome, Internet Explorer, etc.

Coming to game engines, in general, there are many to choose from in the current market. One other to name is the unreal engine, which often gets a comparison with the Unity engine among the game development community. The unreal engine is a very capable game engine which is mostly used for graphic demanding titles. For this thesis, the Unity engine was chosen for different factors. The Unity engine is a very powerful engine that can be used in many ways. Unity offers an engine that delivers all the tools a developer needs in order to develop a mobile game. Due to its many aspects like reasonable pricing, capabilities, and features, it is used by many developers among the community to create as well as mobile games and games for PC. One of the greatest benefits provided by the Unity Engine is the fact that it has the ability to be used as a cross-platform development instrument for game development.

Therefore, developers can save a lot of time because they do not spend the time to develop the game for each individual platform. In the following text passage, some of them will be discussed more in detail:

- (a) **Platform Support:** Platform support is one of the greatest benefits of the Unity engine. The Unity development environment has great support and offers a wide and rich array of different platforms, like windows, macOS, or mobile, to build on. Over 95% of the work which is done within Unity for a platform can be shared between consoles, mobile platforms, web browsers, or different operating systems. Thus, the Unity engine guarantees an easy development process and offers developers to build to any platform that they have the need too. This has great benefit for optimizing the game experience and to make the game available to many platforms if needed, which is beneficial for a serious game. In addition, the workflow can be much improved due to this fact.
- (b) **Good Graphics:** Along with the very beneficial platform support, another great factor about the Unity engine is the advanced graphic it provides for the development of the game, and they are very useful for the design process of the game. Thereby it is immaterial if it is a 3D game or a quiz based serious game like the game developed for this master thesis.
- (c) **Documentation and Support:** For indie developers and small projects, support and documentation play big a role for a successful game. Unity also offers the help of experienced Unity developers as well as documentation within the engine is detailed and well displayed to get enough to troubleshoot the project and to get easy solutions. The well-documented project and the errors that appear can also be shared with the huge community of Unity developers. Through the great support provided by the Unity Engine, a developer is able to find easy and fast solutions in order to solve problems he may encounter while developing a game.
- (d) **Deployment:** The deployment possibilities offered by the Unity platform are easy, as there is no need for complicated processes. Through the Unity engine, the developer can deploy the game across heterogeneous platforms (PC, macOS, Mobile Platforms, web browsers, etc.) by coding the project in C# language. The support for all platforms is given and directly integrated into the Unity development environment.
- (e) **Stability:** Another great benefit offered by the Unity Engine is the stability that is provided while developing.

- (f) Asset Store: The Asset Store is a market place provided by Unity and it is also integrated into the Unity engine as well. Through the Asset Store, a developer can have access to different designs, art and digital downloads, which some can be bought, and others used free or even be shared with others. This shows a great emphasis on the community and creativity.

3.1.1 Why use Android and WebGL as the build platforms?

After deciding on the game engine, it was important to decide on which platform the game will be developed. Through Unity, a developer has a wide array of possibilities based on everyone needs to develop to like mentioned in the previous section. For this thesis and the serious game developed, I decided to build and publish the game for two different platforms. In the following section, I will discuss why both platforms were selected and used for the development of the serious game “Stick To The Story.”

The first platform selected to publish the game and to build to is Android. Android is the most popular operating system for mobile phones next to Apples’ operating system iOS and iPadOS. Through the huge scope of devices using Android, the operating system provides a strong basis to reach a huge amount of possible players. (developers by Google) Other advantages for Android as a platform are:

<https://developer.android.com/games>

- (a) Open Source: One significant benefit of Android as a platform is the fact that it is an open-source platform and that it can be used easily by everyone. This aspect of Android makes a game easily accessible by a wide array of mobile phone manufacturers. Androids’ code is free and can be used by everyone. Due to this fact, the market for Android devices is the largest in the world regarding mobile devices, and this creates a tremendous market for developers using Android as their development platform.
- (b) The use of the Google Play Store as a marketplace: Another reason to consider while using Unity and developing to the Android platform is the fact that Google is providing the Google Play Store as a marketplace, which is the biggest mobile marketplace for mobile apps in the world.
- (c) Flexibility: The most important advantages regarding Android as a platform for this theses is its flexibility. By building a game via Unity for Android, everyone can install the APK installation file from any other source, not only

just the marketplace mentioned. This makes it possible to test and use the application on multiple devices by using the SDK Tool provided by Google or to publish an APK file and provide it to your players by a website, e-learning platform, or a cloud service, for example. Thus, it is possible to install the application directly on the mobile device.

The second platform selected for the development process of the game is WebGL, which is based on the HTML5 foundation. This kind of build greatly simplifies the development process of a serious game because it is easy to reach a wide array of players. The WebGL build allows the game to be embedded easily on a website. There are also various websites where you can fast and uncomplicated upload a WebGL based game for free. Through the WebGL build, it was able to develop a serious game for the web browser and to ensure through this way that as many people as possible will be able to access the game without restriction. The only thing a player needs is a stable internet connection and a web browser to use. It does not matter if the player uses a regular PC or a mobile device. The WebGL build allows both variants (mobile device and PC) to work seamlessly.

Once the development of the serious game was finished, both builds were uploaded on a free wordpress.com website. The WebGL build as a standalone build hosted by simmer.io and a download link for the APK file for Android mobile devices.

Wordpress website: <https://sttswebsite.wordpress.com/>

3.2 Design Process of the Serious Game

3.2.1 Game Theme

The aim of the game theme for this serious game is to create a game that is enjoyable, challenging, educative, amusing, and fun to play. Therefore, the decision was made to create questions based game and to teach players about a topic by giving them different categories of questions. News Literacy was chosen as a topic for this serious game. As mentioned in the theoretical part of this thesis, news literacy, with all its facets, needs to be an important part of today's world of media. Fake news and misinformation are spreading faster than ever thanks to the world wide web. The aim of this game is to teach the player different kinds of skills to raise

their news literacy levels and to help them to understand what fake news, misinformation, and disinformation and as a result to be able to battle them.

Game Theme: A Trivia based quiz-game to raise fake news awareness and to develop news literacy skills.

The design process is often the first step in the development process of a serious game. For this thesis and the serious game developed, it was important to create an engaging and challenging game experience for the players. As discussed in the theoretical part of this thesis, serious games can be found among many different sectors. Serious games can be found in healthcare, education, politics, military and many other sectors where the goal is to raise awareness and to teach by using a gamified experience. Universities and companies use serious games to provide complete and accurate content, depending on the level of the player. Therefore, the aim of the game theme is to provide different aspects to the player:

- (a) **Motivating Effect:** For the serious game developed, it was important to have an interactive environment and dynamic environment. Thus, the implementation of a progression aspect within the game was crucial to give the player to track their skills and progress and to raise their motivation to play and learn more.
- (b) **Expert Behaviour.** Through the serious game, the player can potentially raise his interest in this topic and become an expert. Games with educational challenges may have the potential to make their players' experts on the topics covered.
- (c) **Socialization:** Another advantage of educational games is that they can also serve as socialization agents as they approach student players, competitively or cooperatively, within the virtual world or in the physical environment of a school or university. By networking with other players, students have a chance to share information and experiences, expose game-related issues, and help each other, resulting in a distributed learning context
- (d) **Discovery Learning:** The player should be able to get instant feedback on how well he played the game, and he needs to have a risk-free environment to explore, experiment, and to stimulate his curiosity.
- (e) **Development of cognitive skills:** Games promote intellectual development because to overcome challenges, the player must develop strategies and understand how the different elements of the game relate to each other. By

playing the serious game developed for this thesis, the player can develop important skills regarding news literacy, fake news, misinformation, and disinformation.

- (f) Learning Facilitator: The serious game developed should also act as a learning facilitator to facilitate learning in various fields of knowledge and especially in the area of news literacy.

3.2.2 Logo Creation and Name of the Serious Game

For the design process of the serious game, it was necessary to create a logo and to find a name that suits the game, which was further described in the section above. The name should be interesting enough to trigger the interest of the player to play the game and not to know what the actual gameplay would look like.

3.2.2.1 The Name

The name selected for the serious game was “Stick To The Story,” in short, “STTS.” Thereby it was important for the design process that the name is easy to remember and that there will also be a short version of the name for that reason. In the design process for the name, the idea was that once someone read the name, he will not be able to know right away what the game theme is. However, the design idea was also that as soon as someone knows the game theme, the name is clear and suits the game theme. Withal it is also important to mention that the name “Stick To The Story” is not only a positive thing, and that was also the purpose of the name. Sticking to a story provided by the internet, television or newspaper, for example, is not always wise. Often stories provided are not true and are classified as fake news, misinformation, etc. On the contrary, sticking to the right stories is what the game is trying to teach the player while playing. Through the game, the player should learn how to distinguish between true and false information or to learn how to battle bias and opinion statements from various parties. Therefore the “Stick To The Story” was chosen because the ultimate purpose of the serious game is to teach the player how to earn all different kinds of skills regarding news literacy and how to battle fake news, misinformation, and disinformation.

3.2.2.2 The Logo

Logos play a big role in the perception and acceptance of a game in today's game industry. Therefore it was important to create a logo for the serious game developed for this master thesis that suits the game theme, and that gives a clear understanding of what the game is about. The logo was created by myself on the platform "Affinity Designer for iPad" and contains to main parts:

(a) The Globe



The first part of the logo is a black and white earth wrapped with emergency bands and a warning triangle. The black and white earth demonstrates a clearly defined world with opposing principles and issues. These opposite parts demonstrated by the earth hint the player that there is a big difference between false and true information on today's world and that it is important to distinguish between them. Coming to the lookalike emergency bands, the player can clearly see that the word "FAKE NEWS" is wrapped about the earth. That implies to the player the problem our world is facing on a daily basis and that "Fake News," misinformation and disinformation are spreading exponentially. The last design choice regarding the first part of the logo is the warning triangle, which implies to the player that it is important to be prepared and to pay attention to the mentioned issues our world is facing.

(b) The Name



The second part of the logo design process took the name and the initials into consideration and how they should be displayed. First, it was important to display the full name of the serious game developed. It is important to notice that the colors selected are the same as the first part of the logo (earth) to match the whole design of colors. The upper part of the second part of the logo is the initials.

3.2.3 Aesthetics of the Game

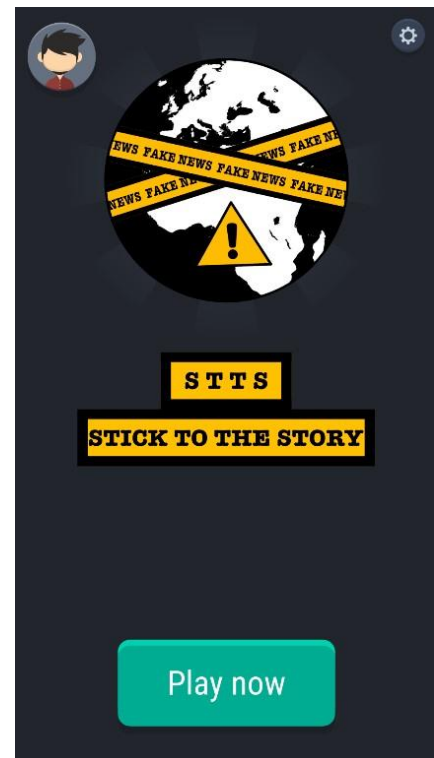
The aesthetics of a game are very important to deliver a great experience to the player. Therefore the design choices that were taken for the serious game “Stick To The Story” are based on free and paid assets from the Unity Asset Store to provide an unmatched user experience to the players. (Unity Asset Store & Gamevanilla)

https://www.wiki.gamevanilla.com/index.php?title=Recommended_assets

It was important to provide the players with a clean and simple game that someone can play without having any issues. Therefore a serious game based on the trivia quiz principle suited perfectly for the kind of the game that “Stick To The Story” tries to be. The players have a clean and minimalistic platform that is easy to use with clear instructions. In the following section, some design elements of the serious game will be further discussed.

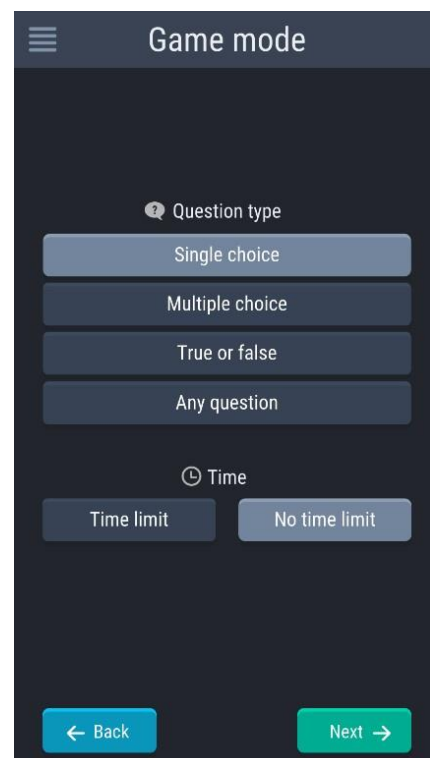
3.2.3.1 Home Screen

The first what a player sees while opening any kind of game is the home screen. In the very first section of the game, it is important to seduce the player to actually hit the “Play Now” button, as well as see the little details used for the logo, name, etc. It is important to notice that the earth-part of the logo is rotating in the life finish of the serious game. This gives movement to the home screen. The intention of this design choice (rotating globe) is to make the player see the details implemented in the logo. The player can also access the home screen the settings menu on the upper right corner and the profile section on the upper left corner of the game.



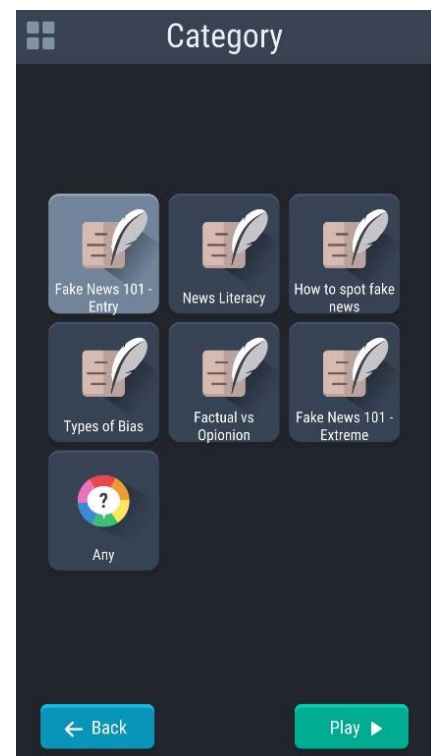
3.2.3.2 Game Modes

The second section a player sees while playing “Stick To The Story” Game Mode screen. Here the player has different possibilities of what to chose. First, while designing the serious game, it was important to give the player the choice of how he wants to play the game. He can decide between different game modes like displayed left on the Game Mode picture. Furthermore, from this screen, a player can change how from this point, the pace of the game will be. With the two buttons on the button, the player can return the home screen or go to the next section.



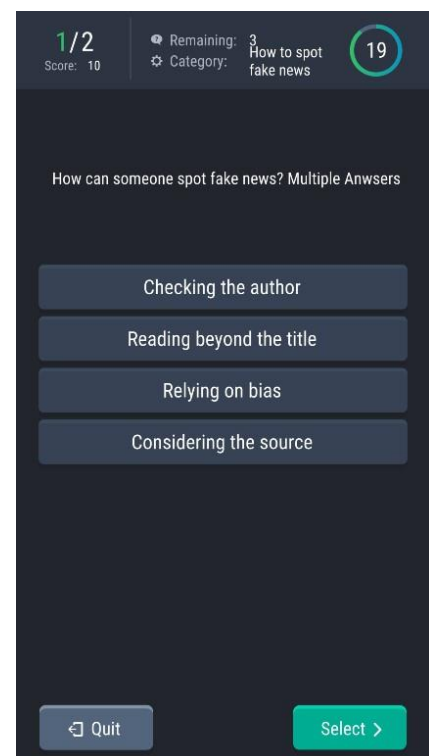
3.2.3.3 Categories

For the design process of the game, this section was very important to be as pleasing as possible for the player and to give him access to different options. Hence I took into consideration the various modes that are available within the game and displayed them clearly, so the player can easily choose. Again, the player can go back to the previous page or click play to launch the actual game and category the player chose.



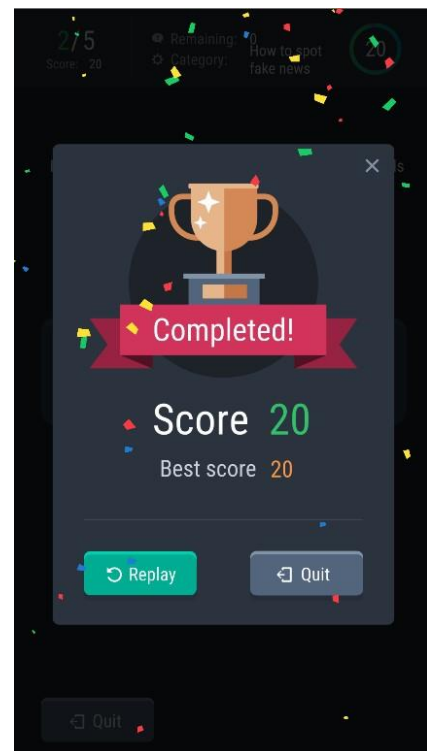
3.2.3.4 Multiple-Choice Questions

Once a mode is selected, there can be various outcomes for the questions. One outcome can be a multiple-choice question-based question. On the left picture, we can see how a variant of a question can be displayed within the serious game. For the design process of this section, and in general, for all questions, it was important to show the question on the very top of the display and beneath the answers. The player must see all questions clearly, therefore the questions displayed with a bigger font and with a different background color. In that way, the player can better distinguish the questions one from another. On the top of this page, the player can see the progress of the current stage (remaining time to answer, remaining questions, score).



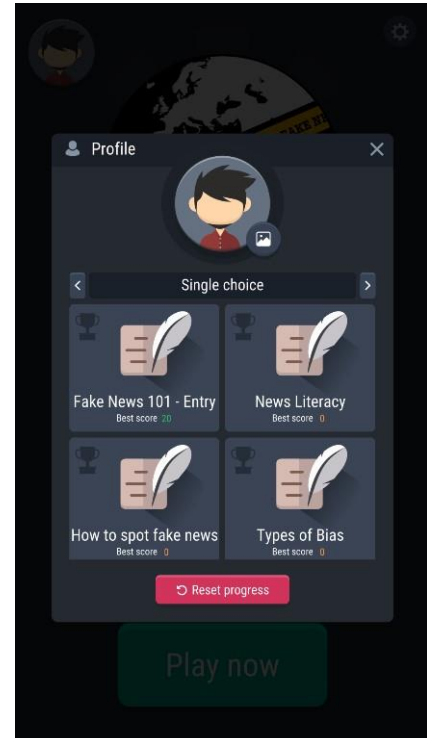
3.2.3.5 Completed Stage and Score

After the player completes a stage, the game sends him to the next page. On this page, the player gets a trophy (bronze, silver, gold) based on his or her results. Furthermore, he can see his score and the best score he has ever reached in this category. The two bottom buttons give the player two different choices. The replay-button restarts the category, and the player can repeat this stage of the game. The quit-button sends him directly back to the home screen, where the game starts again from the beginning.



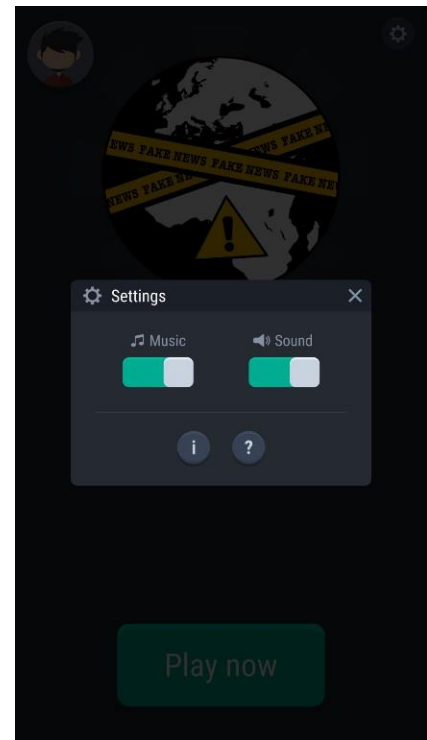
3.2.3.6 Profile Progression

The Profile Progression section is a crucial section for the design process of the serious game and has a big priority in the design process. Here the player can have access to his progression through the game. He can check the high score of each question, what the highest trophy is what he has ever got in a category, and he is also able to see by question type how well he did through the game. Also, the player can choose his avatar and upload an own picture of his own. Finally, a reset button was implemented to reset the progress.



3.2.3.7 Settings

The last design element in this section is the settings page in the game. Here, the player can toggle off and on different settings based on personal preferences. For example, the music or sound effects can be turned off.



3.3 Gameplay Design and Game Mechanics Design

The scope of this section is to demonstrate the gameplay design and the core game mechanics for the serious game “Stick To The Story.” In the previous section, the design choices were discussed in detail and go hand in hand with the decision taken for the design process of the gameplay of the serious game. Therefore it is important to mention the main game mechanics design decision as well as the core gameplay of the game.

- (a) Progression: One of the most important games design choice is the progression system offered by the game. It was important to provide the player with some sense of progression to keep him or her in-game and on track. The player can access at any time the progression section of the game, like showed in the previous section. There, the player can see how well he do in any section, how high his high score for any section is, which trophies he has earned so far. Especially in a serious game like “Stick To The Story,” it was important to provide the player a system like this

to ensure that the player will be motivated enough to reach the desired goal of teaching news literacy skills to the player.

- (b) Variation: Variation is important in any game that keeps players playing. Therefore it is important to provide the certain player kind of variations. The game provides different questions, like true or false, multiple-choice, single choice, or a combination of the above. This helps the game not to be monotonous and too repetitive. Through the design choices taken, it is also possible to change many things within the game. It is possible to change the time a play has to answer the questions or how the questions appear. It is also possible to make the game faster, slower, and to add more questions in a game session.
- (c) Categories: Different categories play a big part in “Stick To The Story” to provide smooth gameplay and to stimulate the educational part of the game. There are separate categories of the game (which will be discussed in detail in the next section) that help the player to understand each topic individually. Furthermore, through the design given to the game, it is easy to implement even more categories at any moment and to add more questions if necessary.
- (d) Forgiveness: The principle of forgiveness plays a big role in games in general. It is important for the player to forgive his wrong answers and to give him the possibility to repeat any section at any given time. Through the fail and repeat process, the player has the chance to improve his skills and through the scoring system, and the trophies he can earn there also raise the hunger for more, and this helps to motivate the player to do better at the next attempt.
- (e) Difficulty: The questions and content used for the serious game developed are on different difficulty levels. There are easy questions, as well as more difficult ones. This concept helps introduce the player into the basics of news literacy and, after that, to improve his skills through the more difficult questions.
- (f) Short-Paced and Time Limit: For a mobile game, it is important to play on the go and have the accessibility to play it where ever the player is. Therefore the gameplay is designed in a way where the player can play short and fast rounds. This ensures that the player can play, learn, and educate himself fast and uncomplicated throughout the day. This can happen, for example, on the bus while drinking a cup of coffee or even between brakes in the university. Short and fast-paced games have proven in the mobile game industry to be very successful because of their availability at any given moment. Through the time limit, a player

has to answer the questions the player needs to think fast and to develop a critical mindset regarding the topics. This helps the player to react and distinguish faster while facing false information. The time a player has can also be changed in the engine. This, for sure, needs further testing.

- (g) Trophies, Score, and Badges: Lastly, it was important for the serious game to provide the player any trophies and a scoring system. Through playing the “Stick To The Story,” the player can earn trophies (from bronze to gold) depending on how well he did on every different category. He will also be able to track his score. This goes hand in hand with the progression system mentioned above.

This section showed how game design elements were used to create an alpha phase of a serious game called “Stick To The Story.” Through the early development stage of the game, it would also need much deeper development and fine work to be ready for a possible release. The current state of the game demonstrates an early phase of a serious game for news literacy and how a game like this could be used to raise awareness in the topics of news literacy and fake news. Through A/B testing and other elements in the development process, issues like the time limits, content, categories, and scoring system should be addressed to deliver a final product for a possible release of “Stick To The Story.”

3.4 Content of the Serious Game

The scope of this section is to present the content used to develop the serious game “Stick To The Story,” such as news literacy, factual and opinion statements, how to spot fake news, and types of bias.

3.4.1 News Literacy

Terms like “Fake News,” misinformation and disinformation are increasingly appearing in literature, media, and social media channels. These kinds of terms trigger many discussions among different participants, such as educators, companies, politicians, and citizens in countries around the world. Many believe that all individuals need to be trained in different skills to be able to differ better what is real and such what is classified as “Fake News,” misinformation, and disinformation. Raising news literacy would help all kinds of actors, from citizens to companies, to differ from real and “Fake News” in general. News Literacy would directly help

to separate opinion statements from factual statements to see the difference between fact and fiction and, as a result, to minimize and limit the rapid spread of information and news that are classified as false information. In short, news literacy refers to the abilities which an individual or an actor can use to see and consume media, news, and information competently according to its own goals and needs. (Mitchel et al., 2019 & Fletcher, 2018)

Hence the importance of news literacy regarding the issues with information one section of the game “Stick To The Story” aims directly to teach different aspects of news literacy while playing. This will help the player to understand better and to develop right at the beginning of the game basic skills and knowledge to battle false information. The player will be confronted with questions about news literacy, what news literacy is, and how to use news literacy effectively to distinguish between false and real information.

Therefore it is important first to say what news literacy is. For the game, news literacy was partitioned in eight aspects. (CNL, 2016)

<https://www.centerfornewsliteracy.org/what-is-news-literacy/>

- (a) Evaluating News and Media Stories: The player needs to understand that evaluating information is important to distinguish between real and false information. It is crucial to take time and read the actual article and past the headline.
- (b) Distinguish between news and opinion: Often news, articles, posts on social media, and journalists deliver not news but opinions about a topic. Hence the players, and in general consumers of information, need to be aware of the fact that news can often be opinions.
- (c) Recognizing Bias: To recognize bias, consumers of information need to take action. Such can be, for example, to compare news reports from various sources and to look for a pattern of unfairness over time.
- (d) Identifying when the news is fake: Once the news is identified as false, it is important to report it.
- (e) Using multiple formats and sources to get news: For the player, it needs to be clear that using more than one format and multiple sources is crucial to detect false information.
- (f) Understanding perspectives and beliefs besides your own: For information to be transparent and real, the players, and in general information consumers, need to be

able to accept other perspectives about a topic and be able to accept the beliefs of other individuals.

- (g) Checking the credibility of the news: Checking the credibility of an article or a post is very important to distinguish between false and real news. Is the author real? Does the image appear somewhere else? Is the website real? Is the information clickbait? There are many ways to check these kinds of issues, suchlike a reverse image search, googling the author, check on other websites.
- (h) Being an informed citizen.

News Literacy takes up a big part of the content from the section of “News Literacy” in the developed game. However, news literacy as a term is not the only thing that is important regarding false information. Therefore, the section tries to teach via questions and the model of trying and repeating about different terminologies, which are important while talking about news literacy. The main terminologies discussed for the game are misinformation, disinformation, “fake news,” and clickbait. (Co-Inform H2020 EI Project, 2019)

- (a) Misinformation: It is inaccurate information inadvertently shared, not intentionally. Something is wrong, but it is shared with no malicious intent. It is not deliberately fabricated information.
- (b) Fake News: “Fake news” has become a big issue and big terminology used by everybody as in the last five years, and it is a problem for fact-checkers and worldwide over, simply because it does not describe actually what the world is dealing with on a day-to-day basis. “Fake News” refers to something as simple as what someone disagrees with. It can represent an opinion someone does not hold, and for that reason, it does not deal with facts or misinformation, which is what fact-checkers should prefer to discuss. Many, also use the term and break it down further into disinformation and misinformation and it becomes a way, a catch-all term by political leaders, by other journalists, and by people in the public eye to negate other peoples views and for that reason, it is difficult to find a proper definition or meaning for “Fake News.”
- (c) Disinformation: Unlike misinformation, disinformation is wrong information shared with to deceive, confuse or blur the lines so that people do not know what to believe anymore. It is deliberate falsehood done in such a way that is not

immediately recognized, but it is designed as a way of hiding the intent and pollute the ecosystem.

- (d) Clickbait: Clickbait is a headline or and ad whose main purpose is to attract attention and to tempt the user to follow or to click the embedded link. This link directs a user to another content usually of low quality or no interest at all compared to the initial title or content a user clicked on. It is a misleading tactic aiming most of the time to generate advertising income and nothing. Therefore, the term “bait” can be found in “Clickbait.”

In the media world nowadays, news consumer needs to decide fast on complex information and on what is true or not. This fast-paced media world that is daily filled with information from many sources makes it for consumers difficult to react properly. Through the fast-paced spreading of information, consumers need to take rapid-fire decisions on how to process the huge amount of information they are getting day-by-day. Thereby, it was important for the development of a serious game to implement enough content to teach the player about different kinds of statements that appear on the web. In the process, it was vital to emphasize what statements the player should focus on. For the game, the decision was taken to emphasize the differences between factual and opinion statements and how to distinguish the difference between them. (Mitchel et al., 2018 and Snap Language, 2016)

Opinion and fact show many differences when there is a comparison. The main differences between factual and opinion statements are the following:

- (a) Factual Statement: A factual statement is a statement that is true and can be supported by evidence. This kind of statement is based on actuality or a true occurrence. A fact is based on actual experiences, observation, or direct pieces of evidence. (Corvino, 2015)

“A statement of fact is one that has objective content and is well-supported by the available evidence.”

- (b) Opinion Statement: An opinion statement is about personal feelings and thoughts. Hence, not only can individuals express an opinion statement, political parties or companies can do this as well to emphasize with their followers. Short, an opinion statement shows the feelings of someone or something about a subject. It is important to distinguish between solid opinions and factual statements. Solid

opinions can also be based on facts, but are nevertheless someone's view on a subject and not facts themselves. (Corvino, 2015)

“A statement of opinion is one whose content is either subjective or else not well supported by the available evidence.”

Below sample questions from the game regarding the section “News Literacy” can be found that were implemented in the game:

- (a) Sample Question 1: How can someone spot fake news? Multiple Answers
 - a. Considering the source
 - b. Reading beyond the title
 - c. Checking the author
 - d. Relying on bias
- (b) Sample Question 2: What is News Literacy? Multiple Answers
 - a. Checking the credibility of news
 - b. Being an informed citizen
 - c. Using single formats and sources to get news
 - d. Take news like they are
- (c) Sample Question 3: How can someone spot fake news? Multiple Answers
 - a. Checking the date
 - b. Checking supporting sources
 - c. Checking if it is a joke
 - d. Not checking the author
- (d) Sample Question 4: Factual Statement. Immigrants who are in the US illegally have some rights under the Constitution
 - a. True
 - b. False
- (e) Sample Question 5: Factual Statement: Increasing the federal minimum wage to 15\$ an hour is essential for the health of the US
 - a. True
 - b. False
- (f) Sample Question 6: Opinion Statement: Democracy is the greatest form of government
 - a. True
 - b. False

3.4.2 How to Spot Fake News

“The fictions and fabrications that comprise fake news are but a subset of the larger *bad news* phenomenon, which also encompasses many forms of shoddy, unresearched, error-filled, and deliberately misleading reporting that do a disservice to everyone” (Kiely and Robertson 2016)

The International Federation of Library Associations and Institutions (IFLA), created a framework on how to spot fake news effectively and successfully. The framework shows eight steps that should be used to spot false news. This framework is also used by the website factcheck.org and is enabled as one of the key frameworks to spot fake news for the game. This framework is used to create demanding questions to teach the player the basics of how to detect false information. (Kiely & Robertson, 2016; IFLA, 2020)

These eight steps were worked out from the mentioned framework by IFLA:

- (a) Consider the Source: Seek information that could be signed for false news. One way is to go away from the story and to examine the website, the advertisements on the website, and the contact page.
- (b) Read beyond: Headlines often are written in a way to be outrageous and to generate clicks and traffic. It is important to read the actual text and beyond the headline to realize if a story is true or false.
- (c) Check the author: The author is a crucial sign to distinguish between real and false news. If someone is reading an article by an unknown author, then it is important to search for information about this author. Websites that spread fakes news and misinformation often use made-up names or do not mention an author at all.
- (d) Supporting sources: Serious news reports offer, most of the time, supporting sources for the reader. A priority for the reader should always be to determine if the info that is given supports the story.
- (e) Check the Date: It is crucial in the world of media consumption to check the date of the story or report. Fake News and misinformation tend to repost old news stories that are not relevant to current events.
- (f) Is it a joke? If it is too outlandish, then it might be satirical. By researching the site, the author can help prevent such problems.

- (g) Check your biases: Own beliefs can be a problematic aspect regarding fake news, misinformation, and disinformation. A reader should always consider if his own beliefs and way of thinking affect the judgment for a report or story.
- (h) Ask the experts: An individual who tries to determine if a story is true or not can always seek help from different portals.

Next to the framework of IFLA, another framework was used for the development of the serious game “Stick To The Story.” The Broadcast hosted by Brooke Gladstone for the show “On the Media” and which is produced by WNYC Studios created a framework called “Breaking News Consumers Handbook–Fake News Edition.” This framework shows another approach to how someone can detect false information hidden in reports and news stories. (On the Media, 2016)

These 11 steps were worked out from the mentioned framework by “On the Media”:

- (a) Capital letters and photoshopped pictures: Crucial signs can be, when everything is written in capitals, or when a picture is photoshopped. Some examples can be if a newsreader sees a picture with an astronaut dog, this would be a crucial sign. There is also a big difference when, for example, the headline of a story is written like this “THE PRESIDENT IS IN DANGER” or “The president is in danger.”
- (b) Banner ads. Another red flag regarding false information can be the overdose of banner ads within a report on a website.
- (c) Checking the domain: Often, fake news websites add a “.co” to trusted websites. Example: abcnews.com.co
- (d) Landing on an unknown site: Landing on an unknown site can always be problematic for a newsreader. Therefore, the framework suggests that when someone is landing on an unknown site, it is important to check the about section of this website. An effective way to do this check of the website is to enter in search engines the website name together with the term “fake.”
- (e) Follow links and references: If a report does not offer resources for further reading or proper references, then it can be signed for false information. This case is important to highlight, but the opposite can happen. Often fake information reports embed links into the report. Here the newsreader needs to remember that false and inaccurate information often leads to even more inaccurate information.
- (f) Verifying the story: If a newsreader is not sure about the article or the news report, then they can try to find the story on a trusted portal. A true story will never be

only on one portal. Therefore, it is important to verify stories by reading from many portals.

- (g) Checking the date: Social media and news reports often resurrect outdated stories. Therefore, it is always important to check the dates of reports and using reverse image search to identify how old something already is.
- (h) Reading past headlines: The true story of something lies in the actual written report and not in the headline of something. Headlines tend to be written in a way to generate clicks and traffic of the website.
- (i) Outdated images: Photos may be misidentified and dated. Using a reverse image search engine can help to identify those.
- (j) Gut check: If a news report makes someone angry, it is probably designed in this particular way.
- (k) Sharing and not sharing: One of the biggest problems regarding fake news is how fast false information can spread around the world. Newsreader should care what they are sharing with families and on social media. Therefore one of the most important steps to spot and to prevent fake news is not to share everything. The framework emphasizes this a lot. “if you are not sure it is true, do not share it! Do not. Share. It”.

Below sample questions from the game regarding the section “How to spot fake news” can be found:

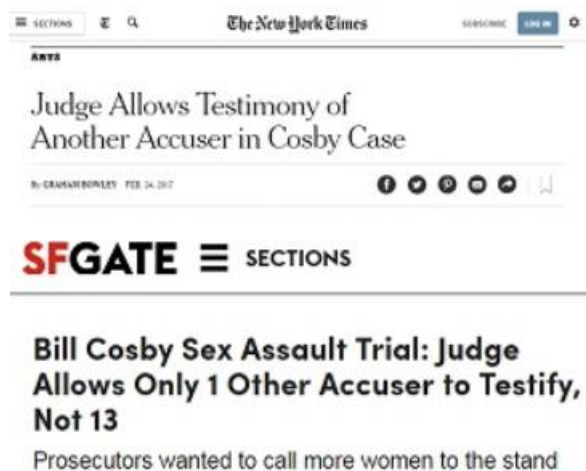
- (a) Sample Question 1: The website “abcnews.com.co” can be trustworthy. The “.co” in a domain often refers to serious websites.
 - a. True
 - b. False
- (b) Sample Question 2: Checking the “about” section of a website is not important regarding fake news.
 - a. True
 - b. False
- (c) Sample Question 3: If a story offers links to follow them. Garbage often leads to bigger garbage.
 - a. True
 - b. False

3.4.3 Types of Bias

When examining the topics of news literacy, fake news, and misinformation, the perception of bias, personal as well as news bias, is a priority to be an informed citizen. Therefore one section within the developed serious game focuses only on the bias, to teach the player how to handle his own bias and how to detect bias in news and reports. Bias can affect the choices of how someone consumes and evaluates news drastically. (fair.org, 2020 & University of Washington 2019)

The content used in the game to teach the player about different biases and how to detect them can be broken down in six types of biases:

- (a) Bias by the headline: When it comes to a newspaper article or report on the internet, headlines are the first thing a reader or a news consumer gets to read. Headlines are often written in bold capital letters to get the attention of the consumer. With the current media situation, headlines can be misleading and can easily deceive the reader. The following example of the “Cosby case” shows two different scenarios regarding bias by the headline:



- (b) Bias through selection and omission: For an editor, it is very easy to express their own beliefs filled with bias. This can happen through the use of different terms and words or by using a specific news story. Within a report, a story or a post, details can be left out and be ignored, or details can be put to get the attention of the reader. To prevent such situations, readers need to compare reports of news with other sources to have a wide variety of sources. Only by acting this kind of bias can be removed from media.

- Example: If during a speech from the Primeminister of Greece, the crowd that is listening to him is shouting, the shouting can be described “as positive shout outs to the president” or as “the crowd is not agreeing and is booing at the Primeminister.”

(c) Bias through placement: The placement of a news story can immensely influence the acceptance of a newsreader and how he is thinking about the story in general.

- Example 1: Stories that appear on the front page of a website or in the newspaper are often received with more excitement from the consumers. Stories that are on the last pages of a newspaper, for example, tend to be unexciting for consumers.
- Example 2: Shows on the radio or the newscast on television tend first to report the exciting stories, which will draw more interest and ratings.

(d) Bias by photos, captions, and camera angles: Photographs, captions, videos, and any kind of visual media can have a great influence on the acceptance of a news story.

Example: Photograph of First Lady Melania Trump



(e) Bias through the use of names and titles:



- (f) Bias by choice of words: The choice of words can influence consumers directly. Something can be explained by a newscaster by using positive or negative words and by using a certain tone.

Chapter 4: Possible Publishing and Marketing of “Stick to the Story”

The following section will discuss how the serious game “Stick To The Story” could be marketed if the game would be published and development to its final state as an indie game.

Marketing a serious game is not as easy as other entertainment games as those often get away with a fictional representation of the physical environment, as well as imprecise input devices. For proper marketing of a serious game, it must have to tie to real-life equipment that is in existence to bring about higher and faster knowledge and experience transfer, thus stimulating the interest of players or possible buyers if the serious game is connected to a price tag. Serious games must be able to contend with the appeal and experience of other entertainment games without having additional limitations. It should have the required interface to capture and measure the several facets of people’s gameplay that document a player’s progress towards the aim of the game. Thus, it needs to be decided how a game like “Stick To The Story” could be published and how the marketing process could be designed if it would be released for the public.

While talking about a digital game like “Stick To The Story,” the first thing that needs to be decided is if it will be free to play or pay to play. There are many possibilities of how a game can be shared with the players. Considering the use of ads, it is noted that a game can be paid (premium), free at first then pay (try and buy), paying with subsequent purchase options (paidmium), free and funded only by advertising (free with ads), or free with purchase options (freemium). Of all these possibilities, freemium triumphs. It accounts for 96% of revenue on the App Store, and 98% on the Google Play Store. In general, the job of a video game publisher is similar to that of a media that has to monetize its audiences. The game must offer the user experience of both progression and frustration, in which the purchase of options is viewed favorably. Some players are happy to pay in a game and are even ready to start again. Once they have paid 99 cents, they are bound to the game and willing to spend more to enrich their experience. The marketing of paid products differs radically from that of free games or freemium. Today, with the digital sales channel dominated by Apple and Google, the developer and publisher capture 60 to 70% of revenue, and the download platform 30 to 40%.

To be ready to publish a game following steps need to be finished before:

- (a) The alpha phase of the game: The alpha phase of a game is the first build of the game, which is shared with the community. In this phase, the developers share their game with potential customers to gain useful feedback and information regarding the current state of the game. The alpha phase is often the first a player gets to see of the game. This unfinished product is not ready for a final release because many bugs can still be in the game.
- (b) A/B testing: After the first build of the game and after collecting feedback from the community, the developing team of the game should consider testing a different version. A/B testing, as many web developers do on their websites, is very useful for finding out what customers truly like. Based on the feedback, two different versions of the game (minor changes with each other) could be developed and shared with the community. Possible differences between the two versions of the game could be, for example, (a) different time to answering the questions, (b) more questions per game sessions, (c) different difficulty levels, and (d) different score systems.
- (c) The beta phase of the game: Once the A/B testing is done and the developing team decided on which version they will stick for the further development process, it is important to eradicate all existing bugs and to make necessary changes based on the feedback got from the community. When this is done, the game will be released for the last time for testing purposes. This beta phase will be the last testing scenario before actually building the game for a final release.
- (d) The final build of the Game: The final build of the game is the state in which the game will be published to the player base.
- (e) Price modeling: Price modeling is a very difficult part while planning and developing a game. Depending on what the purpose of the actual game is (serious game, monetizing, free to play, pay to play, freemium, pay to play, etc.), there needs to be taken different actions. Once how pricing will be handled is determined, the development team can proceed to choose from the available marketing options.
- (f) Marketing channels in the digital era:

- a) YouTube: YouTube is a powerful instrument when talking about digital marketing and especially when talking about how to marketing a game. Depending on the game, YouTube offers many possibilities for marketing. Many gamers are following their favorite streamer and YouTuber on several channels, like YouTube. Collaborating with a well-known YouTuber with a large follower base, YouTube can be a very successful channel regarding game marketing.
- b) Twitch: Twitch can be like YouTube, a very successful platform while talking about video game marketing. These shoutouts performed by a well-known streamer and YouTuber can be a strong force to move the player base actually to buy or download your product. Many gamers watch their favorite streamer day-by-day on twitch. This opens a window to reach the player base easily.
- c) Social Media and Google Ads: Social Media channels offer different ways on how to use them for marketing purposes. Social Media and Google Ads are a very powerful tool to use when knowing the player base that will be interested in your game. Nevertheless, not only ads are useful while talking about Social Media Channels. Shoutouts of well-known channels to gamers can be attractive to reach many potential customers.
- d) Playstore Ads: Because gamers use their mobile phones every day, a great place to market a game is the Playstore. Through smart placements of ads in the Playstore many customers can be attracted.
- e) Reddit (Ads and Subreddit): Reddit is one of the biggest forums on the world wide web. When talking about game marketing, Reddit can be a strong channel to attract specific customers. Through the Subreddit system, a target group can be determined when searching within these Subreddits. Placing Ads will also help to attract as many customers as possible.

Now regarding “Stick To The Story,” some proposals for the steps above will be discussed in the following sections for future work.

- (a) The alpha phase of the game: The alpha phase of the game is the result of this thesis. The serious game was handed to testers, and they answered a questionnaire after and before playing the game.

- (b) A/B testing: For future work, it would be necessary to test different versions of the game to collect valuable feedback from the testers of the game. Thus, two versions could be developed to test, which would be the right one to keep to continue the development process.
- (c) The beta phase of the game: As mentioned above.
- (d) The final build of the Game: As mentioned above.
- (e) Price modeling: The price modeling plays a big part regarding the serious game “Stick To The Story.” Cause of the characteristics of a serious game, it is difficult to find a big player base that is interested in playing such a game. It is also difficult to monetize a serious game. Therefore my suggestion would be to deliver a serious game for free to the public to make it accessible to as many as possible. Because the game theme of the game is to teach news literacy skills, it must be accessible easily for everyone. The ultimate goal of the game should be to battle fake news, misinformation, and disinformation. Thus, a price tag on a game like this would hinder sales and be a barrier to news literacy and the battle against fake news. Delivering a serious game for free would also make the marketing process more complex. Another alternative would be to offer a freemium game. The game itself could be downloaded and played for free, but some sections, features or categories of the game could be hidden behind a paywall. Another case used by many developers to generate money through the game is to implement ads and banner ads from other games/companies in the game and the only way to remove them would also be hidden behind a paywall (paying to remove ads). As a result, the developers would either gain money from ads or through the player that is paying to remove them.
- (f) Marketing channels: Due to the fact that the game developed is a serious indie game, and it is important to remember that the budget is not as big as big game development companies have. Therefore certain conditions regarding serious games and indie game development problems need to be taken into account. These would be the following marketing channels used.
 - a) YouTube: YouTube could be a very powerful channel to distribute a serious game to as many people as possible that could be interested in news literacy. Keeping in mind that the game developed is a game in a niche, it would be needed to research and find YouTube channels that would be willing to promote the game either for free or for a very tight budget. In the

case of reaching out to YouTube channels, it is important to do also research on the follower base to be sure that it will be the right target group for a game with the theme of news literacy.

- b) Reddit: Reddit and the Subreddit system is a great website to find specific customers and players. Through the use of subreddits, it is possible to address the target group that is needed to distribute the game. Subreddits that can be used: r/politics, r/fakenews, r/conspiracy, r/news, r/serious games, r/todayilearned, and many more
- c) Social Media: Like mentioned in the YouTube section, it is crucial to find the right channels to perform marketing too.
- d) Universities and Schools: Universities and Schools are many possible individuals that need to learn about news literacy and fake news. Many students and pupils are vulnerable to fake news and false information. Therefore, collaborations with schools and universities should be sought to convince them that a serious game like “Stick To The Story” would be a great addition to the syllabus of the institution.
- e) Newspaper and News Channels: Newspaper and News Channels are the sources of information in general. Therefore it would be necessary to address them for the ultimate goal of the serious game developed.

Chapter 5: Results

Serious mobile games are a news field in pedagogy and the game industry, and they are growing rapidly day by day. Mobile devices enabled the game industry to move the development of games from stationary devices to mobile devices since most gamers can be allocated to mobile games. Combining the need for games on mobile devices and the importance of News Literacy skills in today's world, a great opportunity arises in developing a game like “Stick To The Story.”

The previous chapters showed a detailed literature review on how researches define serious games in this digital world, how important News Literacy is, and how the marketing of a game like “Stick To The Story” could look like. The scope of this chapter is to present the results of this thesis to answer the Research Questions that elaborated in chapter two to further assist researchers in Serious Games and News Literacy.

What Platform/Framework/Engine to use to implement a free Mobile Game?

Regarding the first Research Question, it was important to find a game engine that would help in the process of developing a mobile game for free. Coming to game engines, in general, there are many to choose from in the current market. One other to name, next to the Unity Engine that was used to develop “Stick To The Story,” is the Unreal Engine, which often gets a comparison with the Unity engine among the game development community. The Unreal Engine is a very capable game engine which is mostly used for graphic demanding titles. For this thesis, the Unity engine was chosen for different factors. The Unity engine is a very powerful engine that can be used in many ways. Unity offers an engine that delivers all the tools a developer needs in order to develop a mobile game. Due to its many aspects like reasonable pricing, capabilities, and features, it is used by many developers among the community to create as well as mobile games and games for PC. One of the greatest benefits provided by the Unity Engine is the fact that it can be used as a cross-platform development instrument for game development. Therefore, developers can save much time because they do not spend the time to develop the game for each platform. In order to find a game engine, it was important to have the following points checked:

- (a) Platform Support in order to develop to different platforms and easy deployment
- (b) Good Graphics that are easy to implement in a game
- (c) Easy documentation of the development process
- (d) Support and help from the community
- (e) Free to use and reasonable pricing

Through the use of the Unity Engine, all of these points are given. The Unity Engine is an engine that can be used free up to a point where a company makes a great profit. For an indie game developer, these aspects are not of a big matter, especially when developing a serious game for educational purposes with a no-profit approach. Another great benefit of using the Unity Engine to develop a mobile game for free is the huge community, the support, and the asset store. These aspects help tremendously in order to speed up, troubleshoot, and finetune the development process. After deciding on the game engine, it was important to decide on which platform the game will be developed. Through Unity, a developer has a wide array of possibilities based on everyone needs to develop to like mentioned in the previous section. For this thesis and the serious game developed, I decided to build and publish the alpha phase of the serious game for Android and WebGL for free. Once the development of the serious game was finished, both builds were uploaded on a free wordpress.com website. The WebGL builds as a standalone build hosted by simmer.io and a download link for the APK file for Android mobile devices, which can be accessed for free.

Wordpress website: <https://sttswebsite.wordpress.com/>

How can we implement a gamified experience for free with a focus for educational purposes (for example, a game to teach digital citizens about Fake News and Misinformation)?

By answering the first Research Question on how a developer can implement a serious indie game for free, it is clear what game engine should be used in order to implement a gamified experience for free. Through Unity and the provided engine, it is possible to develop a serious game easy, fast, and with the desired quality. When talking about serious games in general, it needs to be clear what aim the game should have. In the case of the serious game “Stick To The Story,” which is developed for this thesis, the ultimate goal of the game was

clear: Delivering a game for free in order to help citizens to gain News Literacy skills to battle fake news. Once deciding on the game engine and platform where the game should be developed to (discussed in the previous section), the most important aspect in order to implement a gamified experience for free with a focus for educational purposes is to provide the right content in the game. This means that an ambitious game theme needs to be developed. In the practical part of the thesis, it is shown how the game theme can be formed and how the content is used in order to provide challenging questions and categories with a reasonable difficulty level. Using the right content in the early access phase of “Stick To The Story” is crucial in order to be able to determine possible changes that need to take place if the development proceeds further. The Unity Engine exposed to be a very powerful game engine when deciding to develop a serious game. Through the many possibilities given by the engine (graphics, asset store, stability), it is possible to build any game that is desired by a developer. For “Stick To The Story,” the decision was taken to create a trivia question-based game experience to simplify the development process, the costs, and the game experience. Thus it was possible to implement a serious game efficiently for free.

Another important factor why this game concept and game engine were chosen in order to create the serious game “Stick To The Story” is that it is easily possible for the developer to change the questions, categories, and even the game theme at any time. The content of the game can be changed at any time, and questions and categories can be added in a matter of seconds. That means that it is also very friendly regarding future updates and future development if the game should be released.

How to Marketing a Serious Game?

Considering the third Research Question on how the marketing process of a serious game could look like the thesis provides several answers. Since the game is on an early access state and not ready for a full publish, it is difficult to create a marketing plan for “Stick To The Story.” In order to publish and advertise a game, many steps need to be fulfilled before. The current alpha build of the serious game developed, which is a pilot project regarding a game for News Literacy, would need further development in order to be able to be a standalone game on the Google Playstore, for example. In the fourth chapter, the discussion shows which future steps should be followed to complete the development of the game in order to be able to advertise it correctly. What does this mean for a game like “Stick To The Story”? The research and the

development of the serious game developed showed several things that are important in order to finish the development of the game and to be able to release it:

- (a) Feedback and A/B Testing: Once releasing the Alpha Phase of the game, the developers must get feedback from the players. The feedback is needed in order to gain valuable information to eradicate bugs and to implement new features. After this, the further development process for the game should be to test two different variations. A/B testing is a valuable method in order to see what players like and how the development process of the game will be continued for the Beta Phase. After testing and evaluating the feedback of both versions of “Stick To The Story,” the developer should be able to distinguish which version should be developed in the future.
- (b) Beta Phase: The release of the Beta Phase is the most important part of the future life of “Stick To The Story.” The Beta Phase should include the whole content and all level, stages, and features. There are many differences between the Alpha Phase and Beta Phase of the game. The content of the game needs to be richer, and the design needs to be polished. This release aims to gain feedback from the player to eradicate only the bugs of the game, and the content should not be changed anymore.
- (c) Feedback from testers of the Beta Phase: After the Beta Phase, the developer should be able to identify all bugs the game still has. This should help in order to polish the game in the next step.
- (d) Polish the game and finishing the development process: This is the last step for the development of the game. With the feedback provided through the steps before, all bugs should be eradicated, and the game should be ready for a release. The development team should proceed to a release in the Google Playstore in order to be able to distribute it to as many Android users as possible.
- (e) Price Modelling: Regarding the price tag of “Stick To The Story,” it should be said that a serious game should be free to use for everyone, especially if the developer seeks to raise awareness regarding fake news, disinformation, and misinformation. Through the free download via the Google Playstore, it is possible to help users to increase their News Literacy skills steadily.
- (f) Marketing: Marketing of a serious game differs a lot from how an actual mobile game would be advertised. “Stick To The Story” aims to raise awareness among digital citizens throughout the world. Therefore it is important to advertise the game

with a low budget on the right channels. The sections and the research in the previous chapters discussed these aspects of how this could be achieved. For “Stick To The Story,” it is important to address the right channels. Universities, popular magazines, newspapers, and schools could be powerful channels in order to target the right people for the serious game developed. Social Media Channels, like Facebook, Instagram, Twiter, as well as Youtube, could be used through the use of influencer and popular pages. Google Playstore ads could also be a very powerful tool regarding the reach of the serious game. It needs to be mentioned that regarding a serious indie game, it is difficult to use a big budget on marketing. Therefore collaborations with universities, schools, institutions, and influencers seem to be a great way to start. The marketing aspect of a serious game is one of the biggest parts regarding the future work of “Stick To The Story.” In order to achieve this, a proper marketing strategy and market analysis should be fulfilled to see where the target groups are and how to reach out to them.

Is there an improvement in News Literacy skills while playing a serious game?

In order to be able to answer the last Research Question, it was necessary to distribute the game to volunteers that are willing to test the game. Therefore 45 participants were chosen in order to play the serious game in his early state. The participants were asked to answer the same questionnaire before and after playing the game. Though the questionnaires, it was possible to gain valuable information about different aspects of how well the game performed regarding the increase of News Literacy skills and fake news awareness. The participants were able to choose between 5 possible answers on a scale from 1 to 5, where 1 is “not at all,” and 5 is “yes.” All charts and questions can be found in the Appendix.

Coming to the Research Questions, it was important to see if “Stick To The Story” increases News Literacy skills. The questionnaires provided useful and valuable results. The following test passage will examine some of the results in order to be able to see if it is possible to increase News Literacy skills by playing a serious game.

The first question on the questionnaires was if the participant is familiar with the term fake news. Comparing both questionnaires, it can be seen that there is a great positive increase.

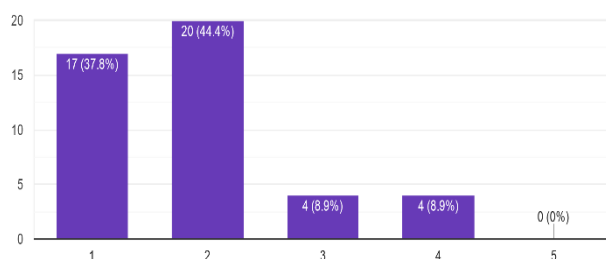
On the first questionnaire, 84.5 percent of the participants answered questions 1 and 2 while on the second questionnaire, 82.3 percent of the participants answered questions 4 and 5, which is clearly a positive increase. Looking at question 2, a similar increase can be noticed. While answering the first questionnaire, 84.5 percent of the participants answered questions 1 and 2 and had difficulties in distinguishing between real and false information. After playing the game and answering the second questionnaire, a great increase can be noticed. 82.2 percent of the participants answered questions 4 and 5 and were more able to distinguish between false and real information after playing the game.

The following charts show all questions and answers detailed, which referred exclusively to News Literacy and News Literacy skills to see if a direct improvement can be a result while playing “Stick To The Story.”

Question 4

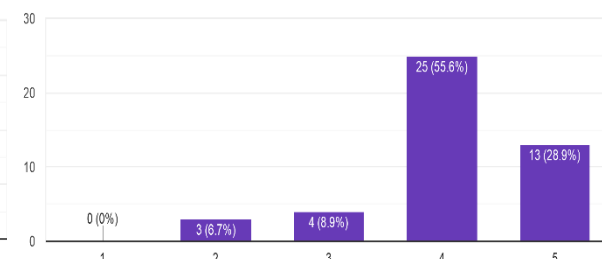
Questionnaire 1

Do you know what News Literacy is?
45 responses



Questionnaire 2

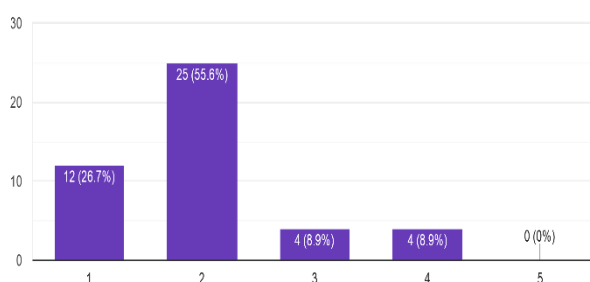
Do you know what News Literacy is?
15 responses



Question 7

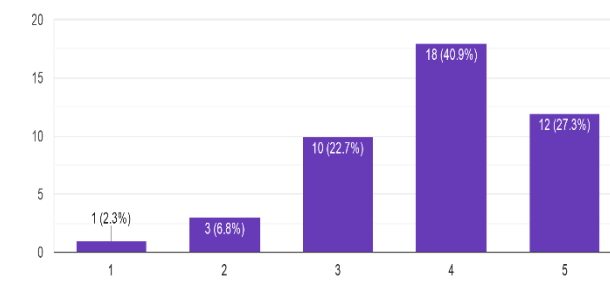
Questionnaire 1

Are you interested in learning more about News Literacy and Fake News?
45 responses



Questionnaire 2

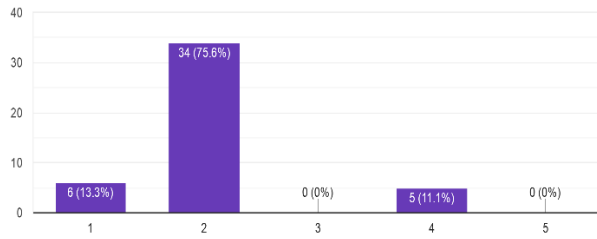
Are you interested in learning more about News Literacy and Fake News?
44 responses



Question 8

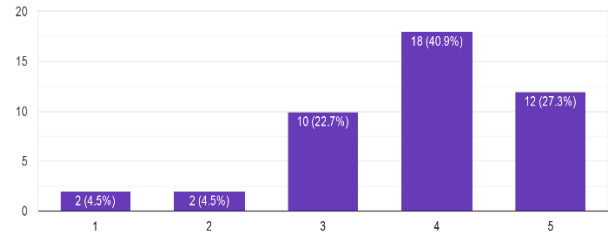
Questionnaire 1

Do you think News Literacy skills are usefull in everdays life?
45 responses



Questionnaire 2

Do you think News Literacy skills are usefull in everdays life?
44 responses



Comparing the results of both questionnaires regarding questions 4,7 and 8, a significant increase in everyone can be noticed. Thus, it can be said that through a serious game like “Stick To The Story,” which is developed as an indie game for free, it was possible to see an increase regarding News Literacy skills and fake news awareness. Therefore, this thesis proves that there is great potential in a serious game regarding fake news and that serious games could be used in different sectors in order to increase skills and awareness for a specific topic. Nevertheless, the questionnaires should not only be used to prove that a serious game can increase different kinds of skills, but the results should also be evaluated in the future if “Stick To The Story” should be further developed.

Chapter 6: Conclusion and Future Work

This master thesis presented the development, design, and possible marketing of a serious game for Android called “Stick To The Story,” intending to teach digital citizen valuable and essential skills regarding News Literacy. The ultimate goal of the serious game developed is to provide a tool that can be used for free by everyone in order to raise awareness against fake news, misinformation, and disinformation and to act as doctrine against them. Developing and designing a serious game as an indie developer is only one of many parts in completing the development and marketing process of a game. Based on the literature research conducted in chapter two, the background regarding the gaming industry with a focus on serious games and the marketing aspects was provided. The aim of the assignment was to provide an in-depth analysis of “serious games,” their approach in the existing literature as well as to develop a serious game in order to help digital citizens in general to face the problems that can occur through misinformation and fake news.

The research questions elaborated in chapter two were briefly discussed and answered in the following chapters. Chapter 3 and 4 focused on a detailed analysis and execution on where and how to develop a serious game for free, how the marketing process of such a game could look alike, and if a serious game can have a direct impact on News Literacy skills. The results of this thesis showed that the Unity Engine is totally capable of for a developer to develop a serious game for free. The results of the questionnaires distributed to participants were also valuable to prove the usefulness of a serious game when talking about teaching skills to digital citizens. The main result of this thesis is the alpha phase of the serious game “Stick To The Story,” which showed great potential in the game and media industry regarding the battle against false information in today's world.

It can be said that the results and research of this thesis and the creation of “Stick To The Story,” paved the way for future researchers and developers. By providing the alpha phase of the serious game, and testing it on the field, the results showed that there should be future work on this topic. A serious game developed to end and published on different channels could have a significant impact on the world of media and could be a valuable asset against the battle to false information. But not only the proposal of completion of the development process of the serious game is handed for future work. In chapter four, we discussed the potential marketing of a serious game and especially of “Stick To The Story.”

“Stick To The Story” can be a serious game used by many individuals to earn viable skills in News Literacy and to raise their own awareness against the problems that occur through false information. Through further development and marketing of “STTS,” it could be possible to provide a doctrine against fake news and to provide a unique way of teaching educational content to digital citizens. With “Stick To The Story,” the battle against fake news, misinformation, and disinformation could change in a positive way.

Chapter References

Abt C. (1970), *Serious games*, The Viking Press, USA

Allcott, H., and Gentzkow, M. (2017). “Social Media and Fake News in the 2016 election.” *Journal of Economic Perspectives*. 31 (2): 211–236. DOI:10.1257/jep.31.2.211.

Alvarez, J., and Djaouti, D. (2010). Introduction a serious game. Questions théoriques. Available at <http://fr.calameo.com/read/0004732847ccfece2dc71>

Argenton, L., Muzio, M., Shek, E. J., and Mantovani, F. (2015). Multiplayer serious games and user experience: A comparison between paper-based and digital gaming experience. In De Gloria, A. (ed.). (2015). *Games and Learning Alliance* (vol.9221). (p.54-62): Springer International Publishing.

Bartolome, N. A., Zorrilla, A. M., & Zaporain, B. G. (2011). Can game-based therapies be trusted? Is game-based education effective? A systematic review of the Serious Games for health and education. Paper presented at the Computer Games (CGAMES), 2011 16th International Conference.

BECTA. Computer Games in Education Project. Coventry: BECTA, 2001. Available at: <<http://partners.becta.org.uk/index.php?section=rh&rid=13595>>.

Berry, L. (1981). The employee as a customer. *Journal of Retailing Banking*, 3(1): 33-40.

Bies, B.(2017), *INDIE GAMING –finding entrepreneurial success in video games*, New Degree Press.

Bittman, L. (1985). “The KGB and Soviet Disinformation: An Insider's View.” *Pergamon-Brassey's*. pp. 49–50, ISBN 978-0-08-031572-0 Retrieved from – https://en.m.wikipedia.org/wiki/Disinformation#cite_note-bittman1985-2

Blackman, S., (2005), *Serious games...and less ! SIGGRAPH Comput. Graph.*, 39(1) :12-16.

Bjørk S., Holopainen J. *Patterns in game design*. [s.l.] : Cengage Learning, 2005. 452 p. ISBN: 1584503548, 9781584503545.

Bode, L., & Vraga, E. K. (2015). In related news, that was wrong: The correction of misinformation through related stories functionality in social media. *Journal of Communication*, 65, 619-638.

Bowker G. C., Star S. L. *Sorting things out: Classification and its consequences*. [s.l.] : MIT Press, 1999.

Boyd, D. (2018). “You Think You Want Media Literacy. Do You?” *Point*.

Retrieved from – <https://points.datasociety.net/you-think-you-want-media-literacy-do-you-7cad6af18ec2>

Capdevila Ibáñez B., Boudier V., Labat J.-M. (2009), Knowledge Management Approach to Support a Serious Game Development. In *Proceedings of the 2009 Ninth IEEE International Conference on Advanced Learning Technologies. 9th IEEE ICALT*. Riga, Latvia: IEEE Computer Society, 2009. p. 420-422. ISBN: 978-0-7695-3711-5.

Caron P.-A. Ingénierie dirigée par les modèles pour la construction de dispositifs pédagogiques sur des plateformes de formation. [s.l.] : Université des Sciences et Technologie

de Lille-Lille I, 2007.

Christopher, E. M. (1999). Simulations and games as subversive activities. *Simulation & Gaming*, vol. 30, num. 4, 441-455.

Cesar, P. Geerts, D. (2011), Past, present, and future of social TV: A categorization, Conference at Consumer Communications and Networking Conference (CCNC), Las Vegas, IEEE, pp. 347-351, <https://homepages.cwi.nl/~garcia/material/ccnc2011.pdf>

Colwell, J., Grady, C.; Rhaiti, S. (1995). Computer games, self-esteem, and gratification of needs in adolescents. *Journal of Community & Applied Social Psychology*, 5: 195-206

Cope, B. and Kalantzis, M. (2000). “Multi-literacies: Literacy Learning and the Design of Social Futures.” *London: Routledge*.

Crooks, S.M., Eucker, T.R. (2001). "Fab 13": The learning factory. *Performance Improvement Quarterly*, vol. 12, num. 2, 108-124.

Davidovici-Nora, M.,(20018), Formes de l'entrepreneuriat "indie" dans l'industrie des jeuxvidéo. Work-shop "Entrepreneuriat dans les organizations culturelles et créatives "/ CREGO - Université deBourgogne, Sep 2018, Dijon, France. hal-02166491

Djaouti, D. (2011). *Serious game design Considérations théoriques et techniques sur la création de jeux vidéo à vocation utilitaire*. «Ph.D. Thesis» (Université ToulouseIII Paul Sabatier, UT3 Paul Sabatier).

Djibouti, D., Alvarez, J., and Jessel, J. (n.a). "Classifying Serious Games: The GPS model." Retrieved from – http://www.ludoscience.com/files/ressources/classifying_serious_games.pdf Retrieved 26 June 2015

Encarnacao, L. M. (2009). "On the Future of Serious Games in Science and Industry." Retrieved from – <http://www.researchgate.net/publication/257921847>

F. N. Field Note (2019). "What is News Literacy? Why is it important?" Retrieved from – <https://ndslfieldnotes.wordpress.com/2013/05/23/what-is-news-literacy-why-is-it-important/>

FINE, G. A. (2002 [1981]), *Shared Fantasy. Role-Playing Games as Social World*, Chicago, Londres, University of Chicago Press.

Fletcher, R. (2019). "The Impact of Greater News Literacy." *Digital news report*. Retrieved from – <http://www.digitalnewsreport.org/survey/2018/the-impact-of-greater-news-literacy/#fn-8045-1>

Gee J. P., (2003), *What Videogames have to Teach us about Learning*, Palgrave Macmillan.

Göbel, S., Hugo, O., Kickmeier-Rust, M. et Egenfeldt-Nielsen, S. (2016). *Serious gamesEconomic and legal issues*. In Dörner, R., Göbel, S., Effelsberg, W. et Wiemeyer, J. (eds.). (2016). *Serious Games*, (p.303-317) Cham: Springer International Publishing.

Golbeck, J. (2008). "Computing with Social Trust, *Human-Computer Interaction Series*." *Springer*, pp. 19–20, ISBN 978-1-84800-355-2

Gounaris, S. (2008). The notion of internal market orientation and employee job satisfaction: some preliminary evidence. *Journal of Services Marketing*, 22(1): 68-90.

Graham (1996), *Serious games: Art, Interaction, Technology*, Barbican Art Gallery, UK.

Himma-Kadakas, M. (2017). "Alternative Facts & Fake News Entering Journalistic Contents Production Cycle." *Cosmopolitan Civil Societies: An Interdisciplinary Journal*. 9 (2): 25–41. DOI:10.5130/ccs.v9i2.5469.

Hunt, E. (2016). "What is a fake news? How to spot it & what you can do to stop it." *The Guardian*.

Hsiao, Hui-Chun (2007), A Brief Review of Digital Games and Learning. DIGITEL, The First IEEE International Workshop on Digital Game and Intelligent Toy Enhanced Learning. Los Alamitos, CA, USA: IEEE Computer Society, 2007. 124-129 Available at: <<http://doi.ieeeecomputersociety.org/10.1109/DIGITEL.2007.3>>.

Jang, S. M., McKeever, B., McKeever, R., & Kim, J. K. (2019). From social media to mainstream news: The information flow of the vaccine-autism controversy in the US, Canada, and the UK. *Health Communication*, 34, 110-117.

Jolls, T. (2012). "Media Literacy: The Foundation for Anywhere, Anytime Learning." *Presentation, UNESCO International Conference Media and Information Literacy, Moscow*. Retrieved from – <http://www.medialit.org/reading-room/unesco-international-conference-media-and-information-literacy>

Jowett, G., and O'Donnell, V. (2005). "What Is Propaganda & How Does it Differ from Persuasion, Propaganda & Persuasion." *Sage Publications*, pp.21–23, ISBN 978-1-4129-0898-6.

Keller, J. (2000) How to integrate learner motivation planning into lesson planning: The ARCS model approach. Présentation au VII Semanario, Santiago, Cuba, Février, 2000. Available at: http://apps.fischlerschool.nova.edu/toolbox/instructionalproducts/ITDE_8005/weeklys/2000-Keller-ARCSLessonPlanning.pdf

Kato, P. M. (2010). Video games in health care: Closing the gap. *Review of General Psychology*, 14(2), 113.

Lavigne, M. (2012). Serious games: que devient le plaisir ludique? Laboratoire de recherche en audiovisuel, Université Toulouse II Le Mirail. Available at: https://www.academia.edu/3123672/Serious_games_que_devient_le_plaisir_ludique?auto=download

A.M. Ledbetter and J.H. Kuznekoff, (2012). More than a game: Friendship relational maintenance and attitudes toward Xbox LIVE communication, *Communication Research*, volume 39, number 2, pp. 269–290.

Lewis, R.C. (1989). Hospitality Marketing: the internal approach. *The Cornell Hotel and Restaurant Administration Quarterly*, 30(3):40-45.

Linderoth J., (2010), "Why Gamers don't Learn More: an Ecological Approach to Games as Learning Environments", *DiGRA Nordic Proceedings*, January.

Lings, I.N.; Grenley, G.E. (2009). The impact of internal and external market orientations confirm performance. *Journal of Strategic Marketing*, 17(1): 41-53.

Loh, Christian Sebastian, Yanyan Sheng, and Dirk Ifenthaler, (eds) (2015), *Serious Games Analytics: Methodologies for Performance Measurement, Assessment, and Improvement. Advances in Game-Based Learning*. Cham: Springer.

Lugmayr, A., Suhonen, J., Hlavacs, H., Montero, C., Sutinen, E., and Sedano, C. (2016). "Serious Storytelling - A First Definition and Review." *Multimedia Tools and Applications*. 76 (14): 15707–15733. DOI:10.1007/s11042-016-3865-5.

Mcfarlane, A., Sparrowhawk, A., Heald Y. (2002) Report on the educational use of games: An exploration by TEEM of the contribution which games can make to the education process. 2002. Available at: <http://www.teem.org.uk/publications/teem_gamesined_full.pdf>.

Marfisi-Schottman I., George S. (2012), "Comment évaluer la qualité d'un Learning Game pendant sa conception? ». In : *Actes du 8eme Colloque Technologies de l'Information et de la*

Communication pour l'Enseignement. TICE 2012. Lyon, France : [s.n.], 2012. p. 80-90. ISBN : 978-2-9813635-0-3.

Martin C.B., Deuze, M.(2009), The independent production of culture: A digital games case study”, *Games and Culture*, June 23th,4(3): 276–295.

Mehm F. « Authoring serious games.» In: *Proceedings of the Fifth International Conference on the Foundations of Digital Games*. New York, NY, USA: ACM, 2010. p. 271–273. ISBN: 978-1-60558-937-4.

Mele, N., Lazer, D., Baum, M., Grinberg, N., Friedland, L., Joseph, K., & Mattsson, C. (2017). Combating fake news: An agenda for research and action. Retrieved from <https://shorensteincenter.org/combating-fake-news-agenda-for-research/>

Michael, D. R., & Chen, S. L. (2005). *Serious games: Games that educate, train, and inform*: Muska & Lipman/Premier-Trade.

Muller M. J. « Participatory design: the third space in HCI.» In: Jacko JA, Sears A [ed.]. *The human-computer interaction handbook*. Hillsdale, NJ, USA: L. Erlbaum Associates Inc., 2003. p. 1051–1068. ISBN: 0-8058-3838-4.

Namioka A., Schuler D. (1993), *Participatory design: Principles and practices*. New Jersey, USA: Hillsdale, Lawrence Earlbaum, NJ, 1993.

Natkin, S., (2004,*Jeux video et medias du XXIesiecle*. Paris: Vuibert, 2004. 112 p. ISBN :2711748448, 9782711748440.

Navarro, J. I., Marchena, E., Alcalde, C., Ruiz, G., Llorens, I. & Aguilar, M. (2003) Improving attention behavior in primary and secondary school children with a computer-assisted instruction procedure. *International Journal of Psychology* 38(6), 359–365

Parker, F., (2013), *Indies Game Studies Year Eleven*, *Proceedings of DIGRA*, <https://pdfs.semanticscholar.org>

Rabardel P., (1993), *Les hommes et les technologies : une approche cognitive des instruments contemporains*. Paris, France: Armand Colin, 1995. (U. Serie Psychologie). ISBN: 2-200-21569-X.

Ruffino, P., (2013), Narratives of independent production in video game culture, *The Journal of the Canadian Game Studies Association*, Vol 7(11): 106-121. <http://loading.gamestudies.ca>

Sauvé, L., Renaud, L. et Kaufman, D. (2010a). Les jeux, les simulations et les jeux de simulation pour l'apprentissage: définitions et distinctions. In L. Sauvé et D. Kaufman (ed.), *Jeux et simulations éducatifs* (p.13-42). Québec (Québec): Presses de l'Université du Québec.

Sauvé, L., Renaud, L. and Kaufman, D. (2010b), L'efficacité des jeux et des simulations sur l'apprentissage. Dans L. Sauvé et D. Kaufman (dir.), *Jeux et simulations éducatifs* (p.339-364). Québec (Québec): Presses de l'Université du Québec.

Schneider, H. and Klurfeld, J. (2008). "The Demand Dilemma and News Literacy in Schools." *Media Giraffe Project at the University of Massachusetts Amherst and the Donald W. Reynolds Journalism Institute*. Video. Retrieved from <http://newshare.typepad.com/mgpaudio/2008/01/video-the-deman.html>>

SJÖBLOM, M., et HAMARI, J. (2016), « Why do people watch others play video games? An empirical study on the motivations of Twitch users », *Computers in human behaviors*.

SICART M., (2008), *Newsgames: Theory and Design*", dans *Entertainment computing: IEC*, p. 27-33.

Smith, B. L. (2016). "Propaganda. Encyclopædia Britannica, Inc." Retrieved from – <http://www.britannica.com/topic/propaganda> Retrieved 23 April 2016.

Spencer, M. (1986). "Emergent Literacies: A Site for Analysis." *Language Arts*, 63(5), 442-53.

Tufekci, Z. (2018). "It is the (Democracy-Poisoning) Golden Age of Free Speech." *Wired*. Retrieved from – <https://www.wired.com/story/free-speech-issue-tech-turmoil-new-censorship?CNDID=50121752>

Squire K., (2006), From Content to Context: Videogames as Designed Experience", *Educational Researcher*, vol. 35, n° 8, pp. 19-29.

Taylor, T.L. (2012). Raising the Stakes: E-Sports and the Professionalization of Computer Gaming. MIT Press.

Tobias, S. et Fletcher, D. (2012). Learning from computer games: A research review. In De Wannemacker, S., Vandercruysse, S. et Clarebout, G. (eds). (2012). Serious Games: The Challenge (vol.280) (p.6-17). Berlin, Heidelberg: Springer Berlin Heidelberg.

Totty, M., (2005) Better training through gaming. Wall Street Journal - Eastern Edition, 245(80), R6-0.

Yusoff A. (2010), A Conceptual Framework for Serious Games and its Validation. Thesis. Southampton: University Of Southampton.

Usatoday [http://usatoday.com/tech/gaming/2006-05-19-serious-games_x.htm] [2006-11-13]

Wagoner, Z., (2009), My Avatar, My Self: Identity in Video Role-Playing Games, McFarland, and Company.

Watters, C., Oore, S., Shepherd, M., Abouzied, A., Cox, A., Kellar, M., Kharrazi, H., Liu, F. & Otley, A. (2006) Extending the use of games in health care. HICSS39. Hawaii, January 3-9.

Wawro A. (2018), Clash Royalemaker Supercell invests \$4.2M in new UK dev Trailmix”, Feb 1st, Available at: https://www.gamasutra.com/view/news/314173/Clash_Royale_maker_Supercell_invests_42_M_in_new_UK_dev_Trailmix.php

Webwise (2019). “Explained: What is Fake News?” Retrieved from – <https://www.webwise.ie/teachers/what-is-fake-news/>

Wood, T., & Porter, E. (2019). The elusive backfire effect: Mass attitudes’ steadfast factual adherence. Political Behavior, 41, 135-163.

Woolley, S., Howard, C., and Philip N. (2016). “Political Communication, Computational Propaganda, and Autonomous Agents.” *International Journal of Communication*. 10:4882-4890. Retrieved from – <https://ijoc.org/index.php/ijoc/article/view/6298>

Zichermann, Gabe, and Christopher Cunningham (2011), *Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps*. O'Reilly

Zimmerman, E. (n.a). "Game Design as a Model for Literacy in the Twenty-First Century." *Gaming Literacy*. Retrieved from – https://www.google.com/url?sa=t&source=web&rct=j&url=https://ilk.media.mit.edu/courses/readings/Zimmerman-Gaming-Literacy.pdf&ved=2ahUKEwj-1aTLw_7mAhWI4IUKH6CMMQFjAAegQIARAC&usg=AOvVaw1fA01MB5zGheOE M4SdeY1F

Internet Sources

CNL - Center for News Literacy (2016). "What Is News Literacy", Article, Retrieved from - <https://www.centerfornewsliteracy.org/what-is-news-literacy/>

Co-Inform H2020 EU Project (2019). YouTube Channel, Several Videos, Retrieved from - <https://www.youtube.com/channel/UCNqVAoBsQAJ79gM2emPzs0w>

Corvino J. (2015), "The Fact/Opinion Distinction", philosophersmag.com, Article, Retrieved from - <https://www.philosophersmag.com/essays/26-the-fact-opinion-distinction>

developers by Google. "Android game development", website, Retrieved from - <https://developer.android.com/games>

Kiely E. and Robertson L. (2016). "How To Spot Fake News", factcheck.org, Article, Retrieved from - <https://www.factcheck.org/2016/11/how-to-spot-fake-news/>

Fair.org (2020). "How To Detect Bias In News Media", Article, Retrieved from - <https://fair.org/take-action-now/media-activism-kit/how-to-detect-bias-in-news-media/>

Fletcher R. (2018). "The Impact of Greater News Literacy", Digital News Report by Reuter Institute and University of Oxford, Article, Retrieved from - <http://www.digitalnewsreport.org/survey/2018/the-impact-of-greater-news-literacy/>

Gamevanilla. <https://www.gamevanilla.com/>

IFLA - International Federation of Library Associations (2020). "How To Spot Fake News", Article, Retrieved from - <https://www.ifla.org/publications/node/11174>

Mitchel A., Gottfried J, Barthel M., Sumida N. (2018) “ Distinguishing Between Factual and Opinion Statements in the News”, Pew Research Center – Journalism & Media, Article, Retrieved from - <https://www.journalism.org/2018/06/18/distinguishing-between-factual-and-opinion-statements-in-the-news/>

Mitchel A., Gottfried J., Stocking G., Walker M., Fedeli S. (2019) “Many Americans Say Made-Up News is a Critical Problem That Needs To Be Fixed” , Pew Research Center – Journalism & Media, Article, Retrieved from - <https://www.journalism.org/2019/06/05/many-americans-say-made-up-news-is-a-critical-problem-that-needs-to-be-fixed/>

On the Media (2016). “Breaking News Consumer’s Handbook: Fake News Edition”, Article, published from WNYC Studios, Retrieved from - <https://www.wnystudios.org/podcasts/otm/segments/breaking-news-consumer-handbook-fake-news-edition>

Snap Language (2016). “Distinguishing fact from opinion”, YouTube Channel, Video, Retrieved from - https://www.youtube.com/watch?v=Gz9ZGW_1oMM&feature=youtu.be

Unity. “Game engines – how to they work?”, info page, Retrieved from - <https://unity3d.com/what-is-a-game-engine>

Unity Asset Store. Retrieved From - https://assetstore.unity.com/?gclid=CjwKCAiA35rxBRAWEiwADqB372Ob-zrI5nCUI8vU55x_rWSaUURKqFHsb0oR1S-QDg2jNzXMPczDUhoC2KoQAvD_BwE

University of Washington (2019). “Savvy Info Consumers: Detecting Bias in the News”, Article, Retrieved from - <https://guides.lib.uw.edu/research/evaluate/bias>

YGD – Youngstone Game Developers (2017). “ Pros and Cons To Consider When Using Unity”, Article, Retrieved from - <https://youngstongamedevelopers.com/pros-and-cons-to-consider-when-using-unity/>

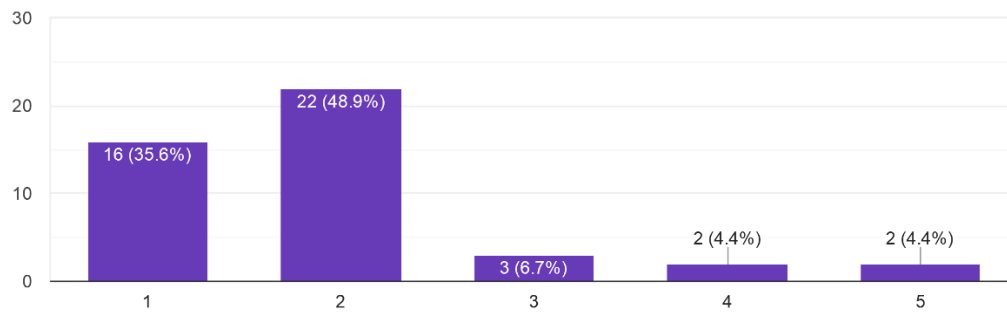
Appendix

Questionnaire One

Question 1

Are you familiar with the term "Fake News"?

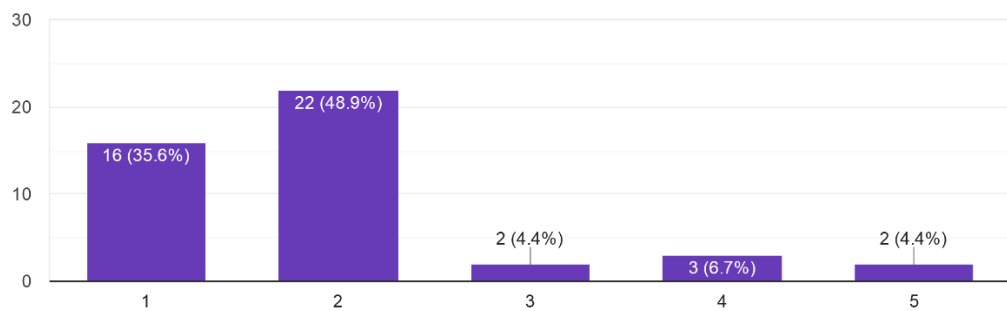
45 responses



Question 2

Can you distinguish between real and false information?

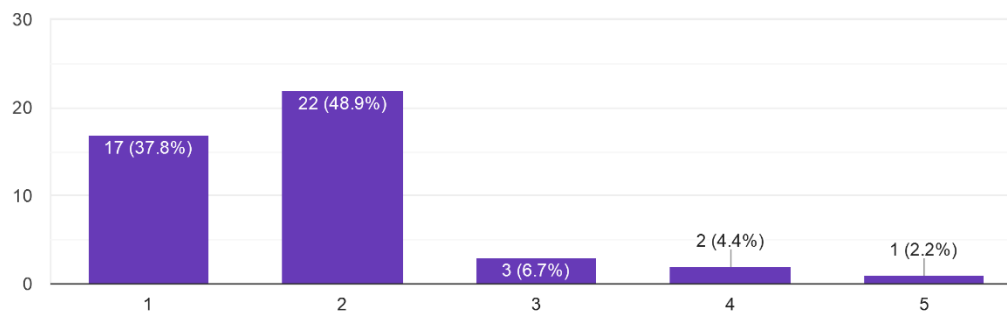
45 responses



Question 3

Can you differentiate between fake news, misinformation and disinformation?

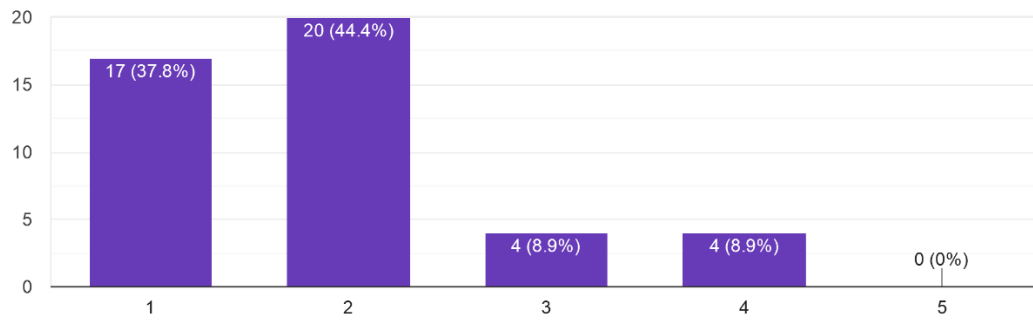
45 responses



Question 4

Do you know what News Literacy is?

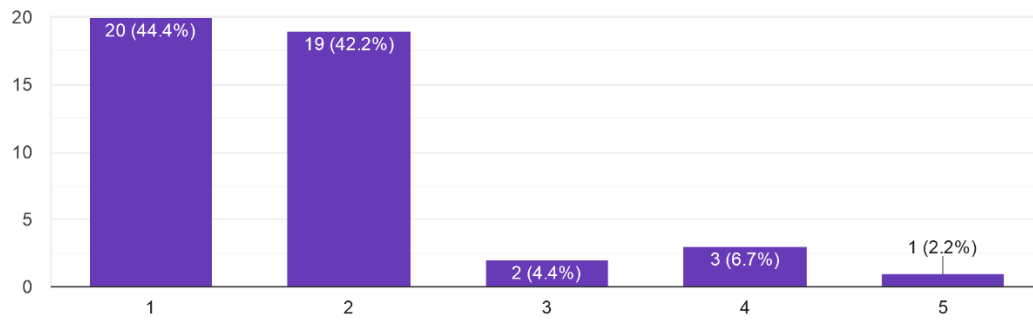
45 responses



Question 5

Is Clickbait a problem in todays media world?

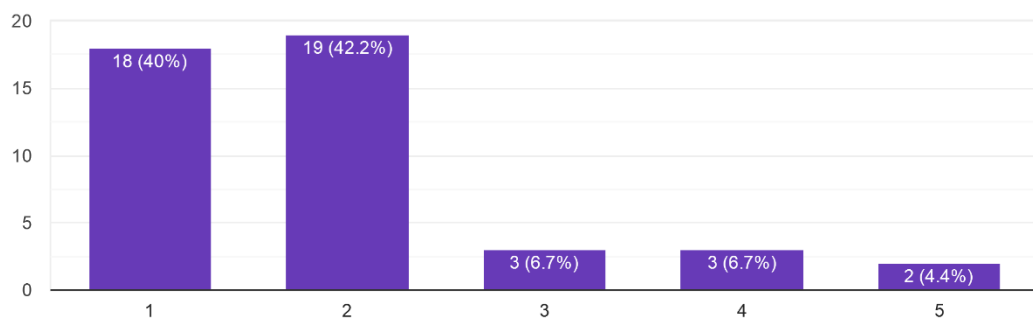
45 responses



Question 6

Can you differentiate factual from opinion statements?

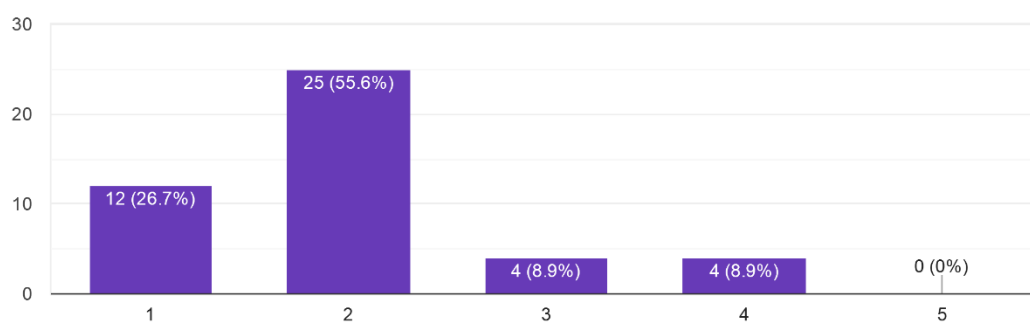
45 responses



Question 7

Are you interested in learning more about News Literacy and Fake News?

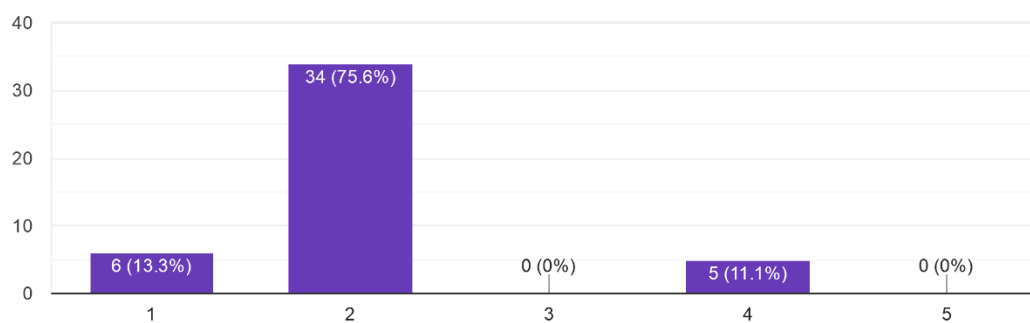
45 responses



Question 8

Do you think News Literacy skills are usefull in everdays life?

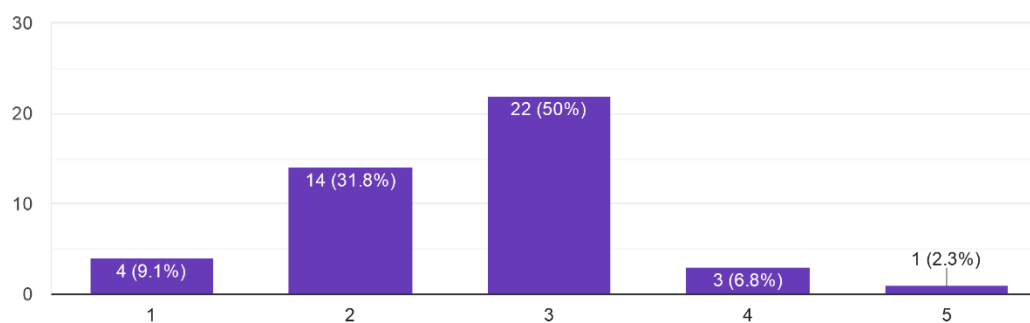
45 responses



Question 9

Do you think a serious game is a valuable asset to implement in education?

44 responses

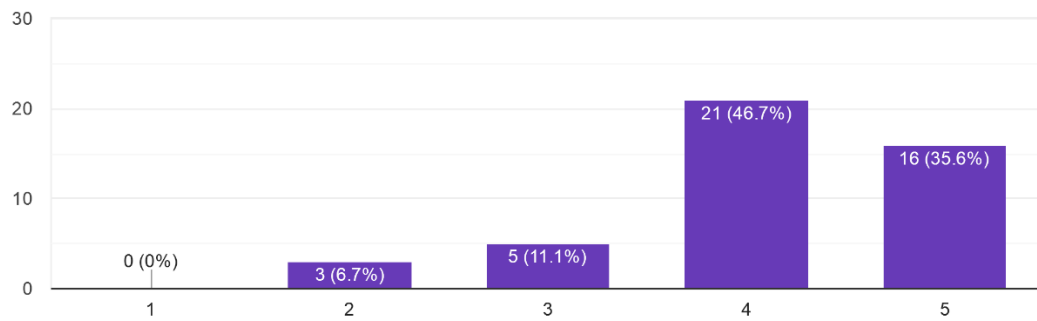


Questionnaire Two

Question 1

Are you familiar with the term "Fake News"?

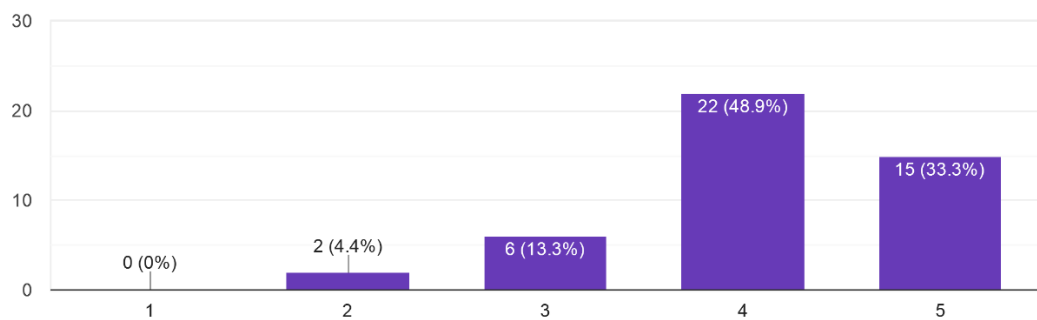
45 responses



Question 2

Can you distinguish between real and false information?

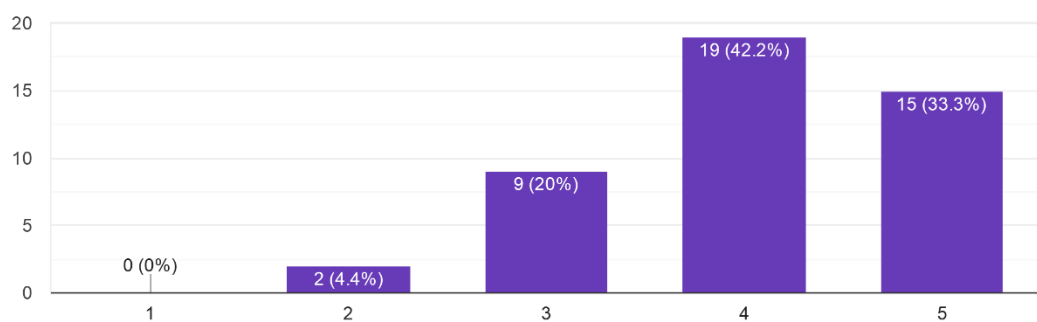
45 responses



Question 3

Can you differentiate between fake news, misinformation and disinformation?

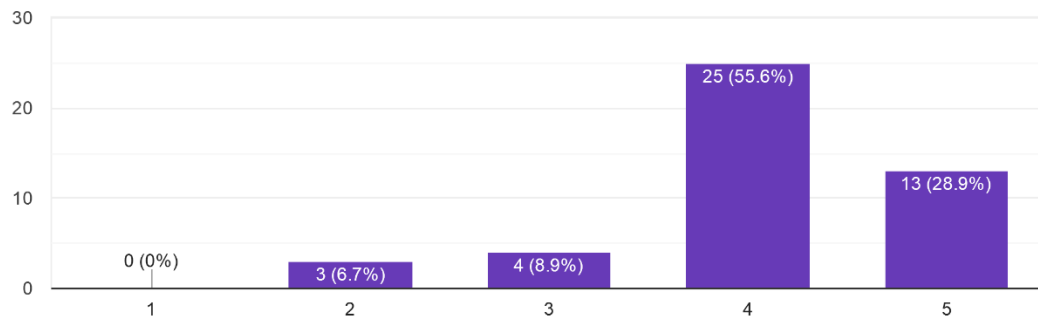
45 responses



Question 4

Do you know what News Literacy is?

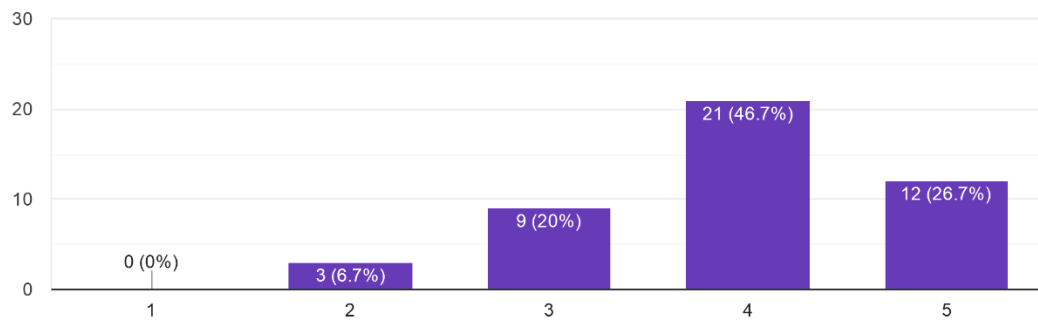
45 responses



Question 5

Is Clickbait a problem in todays media world?

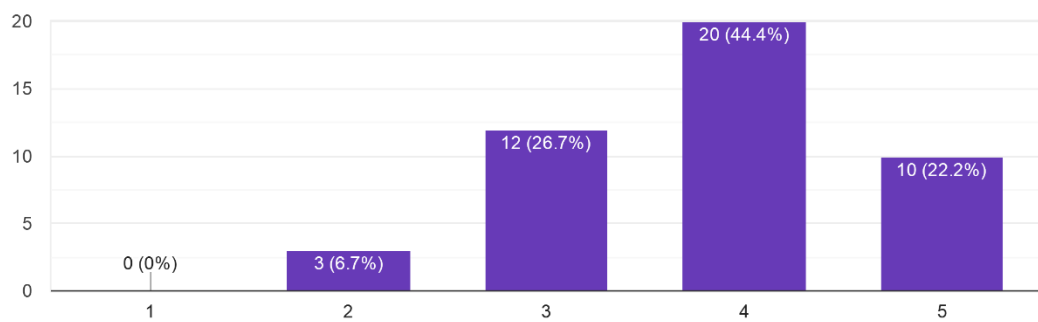
45 responses



Question 6

Can you differentiate factual from opinion statements?

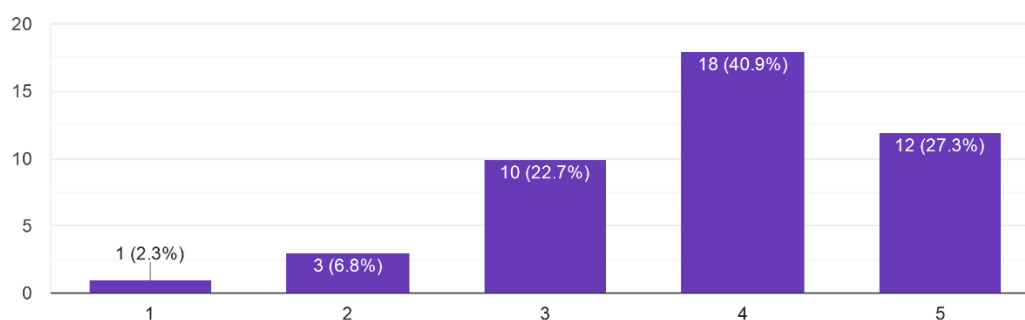
45 responses



Question 7

Are you interested in learning more about News Literacy and Fake News?

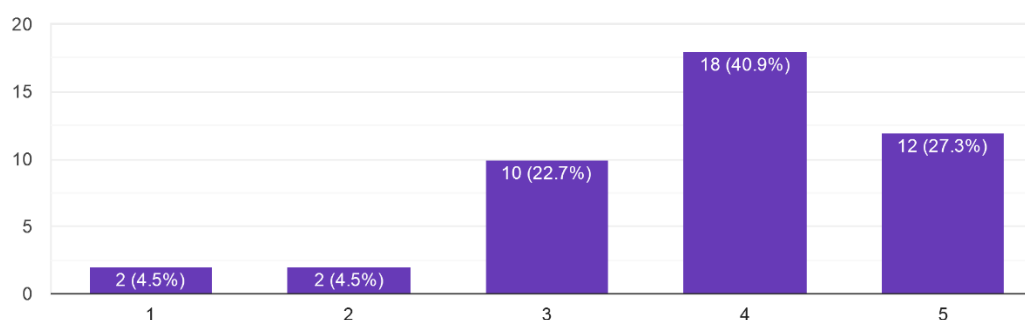
44 responses



Question 8

Do you think News Literacy skills are usefull in everdays life?

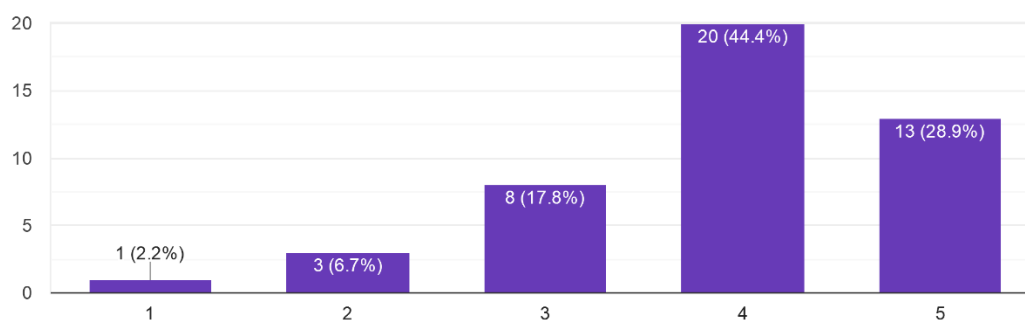
44 responses



Question 9

Do you think a serious game is a valuable asset to implement in education?

45 responses



Website of the game: <https://sttswebsite.wordpress.com/>