The implementation of Learning Principles in *God of War*

An auto-ethnography on how entertainment and education can be combined

Student Name: Jordin Mitchel Montell Pellencau
Student Number: 542097

Supervisor: Dr. Leandro Borges Lima

Media & Creative Industries
Erasmus School of History, Culture and Communication
Erasmus University Rotterdam

Word count: 17206 word

Table of Contents

Abstract

The development of the *God of War* game series and the changes that were applied to innovate it are a good example of how the medium of video games has progressed over recent years. While the quality of games was initially judged based on the level of enjoyment it provided players with, games nowadays tend to be reviewed in a similar fashion to other older media like film and theatre; as potential works of art. How fun a game is to play is still an important aspect to video game reviews, but it cannot be understated how more complex aspects like camera work, world building and narrative themes like fatherhood and family are increasingly present within video games.

While the medium of games is continuing to mature, discussions about the medium's educational value have started to arise. In recent years, numerous "educational games" have been developed, but these could not accomplish their educational goals as they missed the aspect of games that makes them so valuable for education in the first place. As these games were "academized", they made sense from an educational perspective, but lost their appeal from a gameplay perspective. To make sure that educational games like these can be used effectively in the classroom, they need to regain this appeal, effectively motivating students to play these games like they would play commercial games.

For this reason, this research is focused on identifying how learning principles are embedded and implemented in the commercial, narrative-based game *God of War*, which released early in 2018. While focusing on the game's mechanics, narrative and world-building, an attempt will be made to provide a holistic view of how commercial games can educate, despite of their emphasis on amusement. This would effectively answer the question of what educational games can learn from commercial games. The research question can be formulated as followed: "How are learning principles implemented/embedded in the content of the game *God of War* (PS4)?"

To answer this research question, an auto-ethnography is conducted to collect a data set that is based on the researcher's own experiences of the game. Afterwards, a thematic analysis is performed to analyse the collected data. This research is mainly based upon a theoretic framework built by combining J.P. Gee's definitions of learning principles, Henry Jenkins' conceptualisation of environmental storytelling and Adrienne Shaw's framework of game affordances.

As a result of the thematic analysis, five different main themes were identified. These include the presentation of tutorials through visual and textual prompts, how Atreus, Mimir or other NPC's can teach the player about the game world and its inhabitants through the usage of embedded narratives and encyclopaedic impulses, how Kratos can function as a teacher through the learning principle of identification, how Atreus or other NPC's can guide the player through the game world and finally how the player can be stimulated to learn instinctively in specific scenarios through the learning principles of customization, co-design, adding expertise through repeated cycles and system thinking.

Even more importantly, the presentation of these learning principles was always clear and consistent, and only changed based on the narrative state of the game. This resulted in the main conclusion; learning principles should be presented consistently through a limited amount of ways and they should always be rooted in the game's narrative.

Keywords : *Education, Learning principles, Auto-ethnography, Thematic analysis, Game design*

Introduction

Looking back, it is not hard to see how 2005 was a big year for games. It marked the releases of games that are, to do this day, often still spoken about. Examples of this are *Grand Theft Auto San Andreas*, *Tom Clancy's Splinter Cell: Chaos Theory*, and the highly acclaimed *Shadow of the Colossus*. Moreover, it was the year in which Santa Monica Studio released the first game of a series that would turn out to be one of the Sony Entertainment's best-selling Playstation exclusives: *God of War*.

First released on March 22st 2005, *God of War* was an "action-adventure hack and slash game" that was praised for its violent and satisfying combat, its compelling story, which was loosely based on elements of Greek Mythology, and its amazing graphics. At the time, Tom Lane of CNN stated the following:

> God of War is the type of game that makes you remember why you play games in the first place. It is addictive and the action is balanced with a modest amount of puzzle and platforming elements […] It's one of the most violent games on the market (Tom Lane, 2005).

This quote shows the way in which the public viewed the game. It was described as an enjoyable game that enabled the player to wreak havoc in the world of Greek mythology. It exemplified the state of the action adventure genre, and some would even argue that it innovated on it, building further where franchises like the *Devil May Cry* series had begun (IGN, 2016).

However, this review also illustrates how the variable of entertainment of gameplay was the focus of game reviews, ignoring other factors of games like how players learn the game's mechanics, how they get to understand the story and the world that's built, and how the game could contain meaning beyond being entertaining. As a result, researching how players get to experience these aspects of a game through present learning principles would be a vital addition to game studies as a whole. As argued by J.P. Gee in a similar fashion, discussions on video games often focus on the content as it determines the value and nature of the work (J.P. Gee, 2008, pp. 197)

After years of silence, a new *God of War* (Santa Monica Studio, 2018) was revealed during the E3 of 2016. Functioning as a soft reboot of the series while still continuing the story of main protagonist Kratos, the game was now set in world of Norse mythology. Kratos had somehow ended up there after the events of *God of War 3* (PS3), and now had a son, Atreus, that he had to take care of. The game was seemingly going to be different compared to the previous instalments of the series, using a single shot, over-the-shoulder camera angle, focusing on the narrative experience of the game above all else (Barlog, 2016). Combat was also going to change because of this new camera angle, but

also because of Kratos' new weapon, the Leviathan Axe and the possibility to control certain actions of Atreus, such as shooting arrows and prompting his help in solving puzzles that impede player progression. While a lot was going to change in this game, Barlog emphasised that combat would continue to be as violent as was the case in the previous games. This was also apparent in the reveal trailer of the game, and the game has been highly anticipated ever since. The anticipation turned out to be justified. Not only was it well-received by the fans, it was reviewed by critics as the best game of the year, earning various perfect scores after its launch (Playstation, 2019).

Social relevance

Formatted: Font: Bold

From my perspective, the development of the game series and the changes that were applied to innovate it are an example of how the medium of video games has matured over recent years. While the quality of games was initially judged based on the level of enjoyment it provided players with, games nowadays tend to be reviewed in a similar fashion to other older media like film and theatre; as potential works of art. A discussion on games as art has recently emerged, exemplifying how games do not differ that much from any other medium. Like it is the case for any medium, some mediated products can be seen as works of art, and some cannot, despite of what medium it is mediated through (Feige, 2012).

How fun a game is to play is still an important aspect to video game reviews, but it cannot be understated how more complex aspects like camera work, world building and narrative themes are increasingly present within video games. Take the following quote of Gamespot's review of *God of War* (PS4) for example:

> Santa Monica Studios has converted a furious, bloodthirsty icon in Kratos into an emotionally complex father figure. Part of him retains the old violent tendencies that made him a star so long ago, but now with his young son Atreus to protect and guide, we also see Kratos take a deep breath and bury his savage instincts in order to set a positive example (Gamespot, 2018).

As shown in this quote, complex themes like the relationship between a father and a son now stand in the centre of God of War's gameplay, storytelling and world building. This was not only concluded by game reviewers, but it was also confirmed by Cory Barlog, the creative director of God of War, in the recently released documentary *God of War*: *Raising Kratos* (Playstation, 2019). This shows that video games can convey deeper meaning beyond making players enjoy themselves. However, it is also interesting to see how a theme like the relation between a father and his son possibly correlates to the player's learning experience of game mechanics, and how they could learn about more narrative elements and elements related to world building.

For this reason, this research will be focused on how God of War implements learning

principles, as for example formulated by James Paul Gee (2005), and how they relate to the game's content, namely storytelling, world building and game mechanics. The research question can be formulated as followed: "How are learning principles implemented/embedded in the content of the game *God of War* (PS4)?" Subsequent sub-questions can be related to the three focus points of the research: game mechanics, storytelling and world building. These can be formulated as followed: "How are learning principles embedded/implemented in God of War's game mechanics?", "How are learning principles embedded/implemented in God of War's narrative?" and finally, "How are learning principles embedded/implemented in God of War's world-building?".

This thesis will be structured in a basic way, starting with elaborating on the theoretic framework of the research. This will include explaining about different concepts that will be used for the research, as well as elaborating on the thesis' scientific relevance at the same time. Subsequently, an explanation of the research's methodology will follow, focusing on the research's design, data sampling, data collection, operationalization, reliability and validity. Afterwards, the analysis follows, which is structured based on the five main themes that are identified during the data collection and the initial analysis. Finally, the conclusion marks the end of the research, in which the research question will be answered. In this section there will also be focused on potential future research and why this would be important.

Formatted: Indent: First line: 0 cm, Line spacing: Multiple 1,08 li

Formatted: Indent: First line: 0 cm, Line spacing: Multiple 1,08 li

Formatted: Indent: First line: 0 cm, Line spacing: Multiple 1,08 li

Theoretic framework

As the focus of the research will be how *God of War* employs learning principles to teach players about its content, pieces of literature on games and its relation to learning will be used within this research. For instance, Gee (2005) illustrates learning principles that can be present within games. Gee wonders how games motivate players to learn its mechanics, despite difficulties or complexities, and his research points to certain principles related to learning in games, focusing on three aspects: the empowered learner, problem solving and understanding (Gee, 2005). From these aspects, Gee elaborates on the learning principles, focusing on what is meant by them and how they apply to games, while also giving an example of how they can be present in a game and explaining their link to education. I will elaborate on Gee's framework of learning principles, which is the main theoretic focus of this research, but first I will explain why the educational role of games should be researched in the first place. What is the scientific relevance of this research? Afterwards, sections will follow about the learning principles as defined by Gee, focusing on the empowered learner, problem solving and understanding. Finally, I will elaborate on the different forms of affordances that will be used and explain how and which definitions of world-building and narratives will be implemented during the analysis.

The educational worth of games: the scientific relevance

In the book *Digital Game-Based Learning*, Marc Prensky argues that games have educational worth because they motivate players to be competitive, cooperative and results-oriented, while actively seeking information and solutions (Prensky, 2003). This is something that teachers would love to be able to apply to their students, as "motivated learners cannot be stopped" (Prensky, 2003). However, this potential of games has been neglected due to parents and teachers not being aware of it, while themes about games and their relation to violence, as well as their relation to "play" instead of "work" overemphasise aspects of games that do not have anything to do with education (Prensky, 2003). Now, national media are noticing research into the positive effects of games on learning, but the traditional, potentially outdated idea of games purely as entertainment products has not lost its weight (Prensky, 2003). Games and their relation to violence is still a very prevalent theme, and according to Uhlmann & Swanson, there is still a number of researchers that would argue that violent video games increase automatic aggressiveness (Uhlmann & Swanson, 2004).

Despite these problems, a majority of people now believe that games do in fact have a place in learning (Van Eck, 2006, pp. 3). However, a lot of the "serious games", which are games that are made for another primary purpose than pure entertainment (Djaouti, Alvarez & Jessel, 2011, pp. 1),

that resulted from attempts to harness the power of games for learning failed to do so, as they had been "academized" (Van Eck, 2006, pp. 3). These games were the outcome of academics' experiences with edutainment software; the games made sense from an educational perspective, but lost their appeal from a gameplay perspective. To make digital game-based learning effective, one area should not be privileged over the other, and an attempt should be made to find the synergy between pedagogy and engagement (Van Eck, 2006, pp. 3). This is the first reason why research should be done on how commercial games, which are initially made solely for entertainment and profit, present learning principles and what serious game developers can learn from them.

It should also be acknowledged that video game playing typically does not occur in the forms of work or learning, but as an outlet, taking place in rich socio-cultural contexts (Squire, 2003, pp. 51). As a result, digital game-based learning may not have the appeal of outlet-based conventional gameplay, and a synergy between pedagogy and engagement might be hard to pull off. However, these clear contrasts are useful, as they are required to find the middle ground between pedagogy and engagement. As Squire describes the contrast between the gameplay of Pac-Man and traditional schooling, which effectively positions education and entertainment as polar opposites to each other, he creates a useful framework that could be used to not only identify contrasts, but similarities as well.

The potential of incorporating video games into the educational curriculum was already hinted towards in 1978 as G.H. Ball published his work "Telegames Teach More Than You Think". At a time that the most ground-breaking video games were titles like *Space Invaders* (1978, Taito), Ball already identified games' capacity to develop the spatial abilities of children, as well as the assimilation of numerical concepts and reading comprehension (Ball, 1978). More contemporary research points out even more benefits of video games, arguing that video games can be instrumental in developing abilities and skills like visual discernment and the separation of visual attention, inductive logic, inductive discovery, iconic code construction and gender construction (De Aguilera & Méndiz, 2003, pp. 10).

Now, in 2020, there are some examples of how specific, conventional entertainment-based video games can be used in the classroom. One of the most intriguing was how Steve Connely, Senior Lecturer in the Department of Urban Studies and Planning at the University of Sheffield, used the game *Cities: Skylines* (Colossal Order, 2015) to illustrate his module "Connely's Triangle", which considers sustainability in terms of economic, environmental and social concerns (Barr, 2019, pp. 158). It turned out that the game had its limitations, as the game lacks the representation of certain social aspects like religion and ethnicity. As a result, these limitations became the focus of the learning process. As Barr points out, instead of accepting the version of the world that the game represented, students were encouraged to critically reflect on and discuss how the game differed from the reality (Barr, 2019, pp. 159). Higher Education Training Consultant for Pearson Education Bryony Olney, who was called on for support by Connely phrased it as followed:

> So, really, the use of the game was a lever, it wasn't the be all end all, it wasn't the thing that everything hinged on, it was kind of a pivot point for them to reflect on some of the theoretical concepts that they were exploring in the sessions (Barr, 2019, pp. 159).

This example provides a number of different insights that are important to take account of when implementing games in learning-based environments. First of all, the acknowledgement that games do not have to be the "be all end all" solution for modern education is relevant, as it hints towards a first attempt to find a synergy between pedagogy and engagement like it was described by Van Eck (2006). Connely's module could not be fully illustrated in the game, but this was in turn used as an opportunity for critical reflection. Instead of being used as an accurate representation of the real world, its shortcomings were emphasised by using theoretical concepts presented by more conventional means of education. It is an example of how games should, rather than replacing any of the resources that are currently being used in education, should be used to complement the learning process. As a result, *God of War* could potentially be used to teach students about Norse mythology and present themes like fatherhood in a meaningful way, despite its emphasis on over the top violence.

Secondly, specific games should be used for equally specific learning purposes. While the game *SimCity* (EA, 1989) has enjoyed a lot of success in the educational field, Cities: Skylines better suited the specific needs of Connely and Olney. In another example, Vanessa Haddad, Assistant Professor and chair of Liberal Arts, General Studies at the State University of New York, used SimCity to teach an introductory sociology course (Barr, 2019, pp. 159-160). Aside from SimCity, she also used a number of indie games like Two Interviewees (Mauro Vanetti, 2016) and Every Day The Same Dream (Paolo Pedercini, 2009) to expose the often hidden gender bias that is embedded in the recruitment process (Barr, 2019, pp. 160).

The use of games to teach history has also already been heavily supported by scholars. For example, a part of the Games, Learning and Society group has been designing and studying educational activities, and the studies being conducted there are showing that incorporating games to teach history help engaging students in historical thinking and help them to identify underlying ideological frameworks (Spring, 2014, pp. 208). As a result of this research, an afterschool program called CivWorld has been developed, which uses the game Civilization to teach history (Spring, 2014, pp. 208). Also, using games to teach history increases student appreciation of the potential and limitations of historically themed video games, and it also enables students to tackle difficult material (Wainwright, 2014, pp. 579).

Summarizing, games should be specifically selected to illustrate specific examples and for specific learning purposes. As illustrated, games like SimCity and Civilization can be used for different learning purposes. From this perspective, it can and should be argued that games like God of War, games that are primarily meant to entertain their audience, do in fact educate in specific ways for specific learning purposes.

The empowered learner

As Gee argues, "good" video game designers motivate players to learn their long, complex and difficult games, while also letting them pay for their right to do so (Gee, 2005, pp. 5). Gee's use of "good video game designers" here is not particularly interesting, as he solely seems to use the success of games like *Deus Ex* (Eidos Interactive, 2000) *The Elder Scrolls III: Morrowind* (Bethesda Game Studios, 2002) and *Rise of Nations* (Big Huge Games, 2003) as indicators of good video game design. However, his use of the concept of motivation is key here. Not only does Gee acknowledge motivation as a key factor in game design, but also as a process that has to be present constantly in games to assure that games continue to be played. Games are quite often long, complex and difficult to play, and players have to be motivated to push through (Gee, 2005, pp. 5). In this way, games are not necessarily inherently fun to play, just like how school material is not inherently fun to learn.

The constant motivation of gamers can be divided into three main parts: *the empowered learner*, *problem solving* and *understanding*. The empowered learner, as the term itself might already hint towards, is about how good learning requires learners to feel like active agents instead of passive recipients (Gee, 2005, pp. 6), and can be divided into the aspects of *co-design*, *customization*, *identification* and *manipulation and distributed knowledge*. As video games are interactive, there is a constant back and forth process present of the player doing something and the game responding by doing something in return. This encourages players to keep acting. The actions and decisions of players help co-create the game world that game designers have previously established, empowering the learners by co-design as a result (Gee, 2005, pp. 6).

However, there is not only a process of co-design present that is based on the relationship between games and individual players, but a process of co-design can also be identified that is based on the relationships between different players. This process hints towards the presence of communities of practice in games, which emerge as a result of social interaction between players. These communities function somewhat like guilds, as new players are shown the ropes by more experienced players, not unlike how apprenticeship in the real world functions (Slovak, Salen, Ta & Fitzpatrick, 2018, pp. 1). Through this form of apprenticeship, players are enculturated into not simply the technical practices of the game but also the dominant cultural perspectives as well (Slovak, Salen, Ta & Fitzpatrick, 2018, pp. 1).

While this second process of co-design is less visibly present in God of War, since it is a single player experience, it is important to take note of nonetheless, as players don't play a game in a vacuum. Because of large, online platforms like Twitch.tv, players of single player games like God of War have the opportunity to stream their gameplay, enabling hundreds and sometimes thousands of viewers to participate and enjoy the experience. At the same time, these players can take up the role of the viewer, watching the gameplay of another player of God of War, but they can also take up more

active roles as they can guide the player through the game if they have already played through the game (Scully-Blaker, Begy, Consalvo & Ganzon, 2017).

The next step of empowering learners is enabling them to customize their learning process. Gee points out that different styles of learning work better or worse for different people. People can't be in control of their learning if they can't customize how their learning will work (Gee, 2005, pp. 7). The other side of this coin is to encourage learners to try out new ways of learning, and they should not be punished if they aim to do so. In games, players can be allowed to change their gameplay to fit their learning goals and playstyles, while some games might even encourage this process actively.

In education however, this aspect of customization can also be successfully applied. In a gamified classroom, students could be presented with a range of different assignments to choose from in order to earn the required amount of points. This enables students to customize their learning experience, and allows them engage with the content in ways that are well-suited to their specific needs and competencies (Brunvand & Hill, 2018, pp. 5).

Following this, the aspect of identification is based upon the assumption that deep learning requires an extended commitment; one that, in this case, originates from taking on a new identity that is heavily valued (Gee, 2005, pp. 7). Gee argues that games offer player identities that trigger deep investments on the part of the player in two ways. While some games offer an already intriguing character that players want to inhabit, other games offer a relatively empty character whose traits the player must determine (Gee, 2005, pp. 7).

In the specific case of God of War, Kratos is an already known character, but more interestingly, it is a character that has often been the subject of controversies surrounding video game violence and game representations of masculinity. Kratos has often been described as the archetypical representation of toxic masculinity, as the majority focused on violence, rage, revenge and the subsequent destruction of the entire Greek pantheon (Conway, 2019, pp. 1). From this perspective, it will be interesting to see what players can learn from Kratos' past and how he now functions as a father.

However, playing as a certain character should not inherently be described and seen as identity play, as players could identify with non-playable characters (NPC's), as well as the environment and the narrative in which the characters are placed (Shaw, 2011). This is illustrated by Shaw's funny example of an African-American woman in her late 30's playing God of War, who states the following: "Kratos is just the thing on the screen with the knives. He could be a bunny rabbit for all I care" (Shaw, 2011, pp. 1)

Finally, Gee points to the aspect of manipulation and distributed knowledge to explain the concept of the empowered learner. Games can offer manipulation of the game world and everything that exists in it. Good examples of this are objects that can be picked up in a game world, but this logic is also applicable to objects or even characters that can be interacted with, like doors or shop owners. The key feature of these characters and objects that the player can manipulate, is that they are 'smart

tools'. The knowledge of the player and the character have to be used in unison to play the game successfully (Gee, 2005, pp. 8).

Problem solving

In a separate study on the development of problem solving and collaboration skills using mobile serious games, a number of different, interesting insights were generated that support my hypothesis, in which I state that games that are primarily focused on entertaining can still educate in specific ways. The implementation of mobile serious games in the classroom did not only significantly increase the problem solving and collaborative skills of students, but they also found the classes to be more fun and engaging (Sánchez & Olivares, 2011, pp. 1950). Adding to this, students had a more accurate perception of their own capacities for plan execution. In this case, students had a better eye for details and were more careful to make sure that the steps that they made were correct (Sánchez & Olivares, 2011, pp. 1950).

Returning to the aspect of problem solving, Gee identifies how games order problems in such a way that players are forced to come up with creative hypotheses that do not only work for these particular instances, but can also be at least partially applied to harder problems in the future (Gee, 2005, pp. 9). In this sense, it is about adding to the learner's expertise gradually in a well-structured way, as confronting learners with more complex problems too early on can lead to them coming up with creative solutions that are not a easily applied to other problems.

Games are also supposed to be "pleasantly frustrating", providing players with challenges that feel hard but doable at the same time (Gee, 2005, pp. 10). When encountering and failing certain challenges in games, players receive feedback from the game on why and how they failed. This is not something that the games provides in an explicit manner, but it is something that should and can be deducted by the player. Because of this "feedback", players get a sense of improvement, eventually leading to success.

In educational games, this idea of pleasant frustration is also important to strive towards, as they often struggle with balancing challenge and game progression to reach the most optimal outcome (Orvis et al., 2008, pp. 2417). If the game is too hard, a player will eventually stop playing it, but if the game is too easy, players will learn very little, making the instructional side of the game ineffective.

Eventually, expertise is formed in any area by repeated cycles of learners practicing skills until they are nearly automatic, only to subsequently fail and having to reflect on their learning and start all over again (Gee, 2005, pp. 10). In games, these cycles of expertise are inextricably linked to the overall pacing of a game, and good games give players time to learn, present them with a challenge, and let them learn again afterwards.

Adding to this, games are also good at presenting information "on demand" and "just in time", as they provide the player with verbal information about upcoming problems just before they

encounter them (Gee, 2005, pp. 11). An example of this is how most games use a brief tutorial at the start of the game, which Gee explains through the metaphor of fish tanks and sandboxes, to introduce the basic mechanics of the game to the player. Sometimes this is even extended into the rest of the game by using verbal information or little pieces of text that pop up in the screen when the player can't figure out how to move forward. Finally, games teach players to solve their problems by portraying taught skills as strategies to move forward.

Understanding

The final aspect of how Gee approaches learning principles in games is the aspect of understanding, which can be explained through two parts: system thinking and meanings as action images. System thinking relates to how people learn best when they see how the learned material fits within an overall larger system. According to Gee, games help players understand how each of the elements of a game fit into the overall system of the game and its genre (Gee, 2005, pp. 14). Liarakou et al. support this claim, as they found that digital game-based learning helps developing important competencies like strategic and system thinking, problem solving and planning (Liarakou, Sakka, Gavrilakis & Tsolakidis, 2012). While this is done appropriately in games, schools struggle. A lot of the time, students in schools fail to see these systems in which the facts that they are learning fit, subsequently making the facts meaningless. (Gee, 2005, pp. 14).

Secondly, words and concepts gain their meanings when they are clearly tied to perception and action in the world. People think through their own lived-through experiences, and because of this, the aspect of meaning through action images as a learning principle is extremely important. According to Gee, this is the heart and soul of games. Games make the meaning of words and concepts clear through experiences that the player has, even potentially reaching the point of making philosophical concepts concretely realized in action and image (Gee, 2005, pp. 14).

Game design, affordances and mechanics

Salen & Zimmerman's conceptualisations related to game design will be used to analyse the content of *God of War*. Design is the process by which a designer creates a context to be encountered by a participant, from which meaning emerges (Salen & Zimmerman, 2004, pp. 2 of chapter 4). Departing from this definition, four factors can be identified. The first is the *designer*, which is the individual or team of people that creates the game. However, as fan cultures emerge, which blur the lines between producers and consumers, the designer can often be considered as culture at large (Salen & Zimmerman, 2004, pp. 3 of chapter 4). This idea of fan cultures has regularly been written about. Even in 1984, Michel de Certeau described these people as "textual poachers", relating to how fans approach media texts and how they mine them for elements that are personally pleasurable or useful.

Eventually, they can even reconstruct new texts from these poached materials (Jenkins, 2012, pp. 20).

The *context* of a game takes the form of spaces, objects, narratives and behaviours (Salen & Zimmerman, pp. 3 of chapter 4). Clearly, the context can be seen as the world that the player inhabits. It is interesting how a game can function as a cultural snapshot; they capture certain beliefs and values from a particular space and time, and are expressed through the game's mechanics, narrative and world-building (Flanagan & Nissenbaum, 2014, pp. 6). Third, the *participant* of a game is the player, which interact with and manipulate the context through gameplay (Salen & Zimmerman, pp. 3 of chapter 4).

One of the three aspects of game design that will be focused on is the concept of game mechanics and its affordances. Game mechanics are methods invoked by agents, designed for interaction with the game state (Sicart, 2008). Basically, the mechanics of a game are the ways in which a player can interact with the context of a game. However, these interactions are constrained by the game's rules. For instance, the player can command Atreus as Kratos to shoot an arrow using the square-button on the Playstation controller. However, if Atreus is knocked out, or if he does not have any arrows at his disposal, he will not shoot. In this sense, shooting arrows is a game mechanic, while the limitations of shooting the arrows are the game's rules.

This conceptualisation of game mechanics becomes increasingly interesting when considering the concept of affordances. Affordances can generally be defined as opportunities for action (Cardona-Rivera & Young, 2013, pp. 4). The concept is based upon a cognitivist approach that was introduced by J.J. Gibson (1977), which suggests that people have direct access only to sensations, which are integrated with memories to build up symbolic representations of the environment and its' potential for goal-oriented action (Gaver, 1991, pp. 1). Because of this the perception of affordances is reliant on the person that is about to undergo the action. Therefore, there can be a difference between what is possible in a game and what is perceived by the player as a possibility. Cardona-Rivera & Young explain this as real affordances and perceived affordances (Cardona-Rivera & Young, 2013 pp 4). The practice of advertising real affordances in a game in the hopes of eliciting an accurate perceived affordance is called feedback, and the success of this practice determines whether there is a difference between real and perceived affordances in a game (Cardona-Rivera & Young, 2013, pp. 4).

Adding to this, Adrienne Shaw's (2017) model on the encoding and decoding of designed affordances can be used, as it better accounts for power, resistance and interactivity in digital media environments. Summarizing, this model is a tweaked version of Stuart Hall's encoding/decoding model to be able to deploy it in new media. Shaw argues that this necessary, because a way has to be found to understand the power differentials involved in how interactive media technologies are created and used, while acknowledging the fact that the distinction between the production process and the act of reception does not adequately capture the interactivity of new media texts (Shaw, 2017, pp. 596). This aligns with what is said by scholars like Henry Jenkins and Michel de Certeau about fan cultures

and the blurring of the lines between producers and consumers. At the basic level however, Shaw's model is still very much like Hall's original model on the encoding and decoding of media texts, as Hall's known conceptualisations of *dominant*, *negotiated* and *oppositional readings* are employed in this model as well. While dominant readings refer to the intended, encoded reading that has been inserted in a text, negotiated readings refer to using a text in unexpected and emergent possible ways. Finally, oppositional readings refer to not using a text "correctly" in the way it was intended to be read (Hall, 1991)

While Hall relates his model to how texts can be interpreted, Shaw focuses on potential activities with new media texts, objects and forms. To do this, Shaw uses Gaver's (1991) typology of affordances and Nagy & Neff's (2015) imagined affordances. Gaver identifies three different kinds of affordances, namely *perceptible affordances*, *hidden affordances* and *false affordances*. Firstly, common examples of affordances refer to perceptible affordances, in which there is perceptual information available for an existing affordance (Gaver, 1991, pp. 80) Secondly, if there is no existing information, then there can be spoken about hidden affordances, requiring inference from other evidence. Finally, if information suggests to a non-existent affordance, a false affordance can arise, which makes users act in a non-fitting way (Gaver, 1991, pp. 80). This typology is very similar to Cardona-Rivera & Young's typology of real and perceived affordances, as it also refers to a discussion on different affordances that come forth from reception. For ease of use, I will continue to use Gaver's typology, as it has already been incorporated in Shaw's model, while taking into account Cardona-Rivera & Young's conceptualisation of feedback.

Moreover, Shaw incorporates Nagy & Neff's (2015) typology of imagined affordances to her adaptation of Hall's encoding/decoding model. Interesting in this conceptualisation is that the "imagined" part of the concept does not necessarily refer to a false affordance. In this case, the concept of imagined affordances refers to the fact that affordances are more often than not based on expectations of technology that are not fully realized in conscious, rational knowledge, but are nonetheless materialized in socio-technical systems (Nagy & Neff, 2015, pp. 1). The "imagined" part of the concept refers to the fact that all technological affordances are to some degree imagined, and it troubles the use of affordances as static. Ultimately, it depends on humans and their actions (Nagy & Neff, 2015, pp. 2). Getting back to Shaw's model, the concept of imagined affordances can be linked to Hall's three readings of texts and Gaver's typology of three different affordances.

Taking the affordances of the game mechanics of God of War into account will be vital to the analysis, as specific affordances in games tend to support specific learning principles. For example, MMORPG's (Massive Multiplayer Online Role-Playing Games) like *World of Warcraft* and the affordances of their game mechanics have been praised for supporting second language learning and

the development of literacy skills, as players create communities and interpersonal relationships (Rama, Black, van Es & Warschauer, 2012, pp. 324).

Narrative and world-building

Finally, narratives and world-building are the two other aspects that will be analysed in this research. To be able to analyse these two aspects, I will define both concepts and explain how they differ from one another. Skolnick's (2014) book on Video Game Storytelling will be used to differentiate between the two aspects.

The narrative refers to the story elements that are present within the game. This relates to the events that occur and the characters that are involved. On the event-level, as in many other narrative-driven media, a "Three Act Structure" may be applicable. As is the case in films and novels, games often contain this principle, structuring its narrative in three phases: the setup, the confrontation and the resolution (Skolnick, 2014). Skolnick also mentions different themes of story structures, but also certain character archetypes. These aspects will be used when speaking of the narrative of *God of War*.

Applying this narrative-driven logic of media like films and books to games has quite often been debated by scholars, as ludologists would argue that games are essentially different than other media and wanted to shift towards solely studying game mechanics, while on the other hand, narratologists would claim that games, at their core, are narrative-driven experiences and should be studied alongside other storytelling media (Jenkins, 2004, pp. 118). Jenkins seems to argue for a reasonable middle ground in this debate. As he argues, games share traits with other forms of cultural production, acknowledging that games can have narrative aspirations and tell stories, but do so differently compared to other media (Jenkins, 2004, pp. 120). Secondly, the experience of playing games can never be reduced to the experience of a story, as many other factors that have little or nothing to do with storytelling contribute to overall development of great games (Jenkins, 2004, pp. 120)

In her article on interactive narratives, Marie-Laure Ryan bridges the gap between the analysis of more conventional narratives and narratives in games, as she focuses on the design problem of integrating the user's activity into a framework that fulfils the basic conditions of narrativity; a sequence of events involving thinking individuals, linked by causal relations, motivated by conflict and aiming at its resolution (Ryan, 2009, pp. 43). As she combines interactivity and narratives, two forms of narratives in games are identified: *playable stories* and *narrative games*. In playable stories the player's actions are subordinated to narrative meaning, while in narrative games the story is meant to enhance the gameplay (Ryan, 2009, pp. 45). To elaborate, while the genres of playable stories include table-top role playing games, stories based on decision trees, hypertext fiction, simulation games and interactive dramas, players of narrative games play to win, to beat the game and the story is

mainly the lure into the game world (Ryan, 2009, pp. 46). Within these two forms of narratives, the interactive nature comes forth in either a bottom-up way, which are emergent stories that can potentially occur during gameplay, or in a top-down way, which are stories that rely on pre-scripted content (Ryan, 2009, pp. 51).

While the narrative consists of a chain of events, set in motion and experienced by certain characters, the aspect of world building is more contextual in games. It's about how a game presents its world and how this relates to its believability. As Skolnick points out, a story does not have to take place within the real world, but differences between ours and the world of the story need to be established. Rules should be set, and should be consistently followed (Skolnick, 2014). In the case of *God of War*, the story is set in Norse mythology. As a result, characters and enemies that are encountered should look like they fit in this mythology, and environments should be designed in such a way that it looks and feels like an ancient version of Norway.

In contrast to what is argued by Skolnick, world building can, at times, overtake the narrative of a game. This is explained by Mark J.P. Wolf in his book on the theory and history of building imaginary worlds. While he does acknowledge that, more often than not, world building is something that occurs as a background activity, creative works often exhibit an, as Wolf puts it, "encyclopaedic impulse" for explanatory interludes. In these instances, the narrative halts so that information about the world and its inhabitants can be given (Wolf, 2013, pp. 30).

Another principle that relates to world building, is the concept of environmental storytelling, which can be described as narrative backstory and exposition by embedding it in the environment itself. Environmental storytelling can infer the existence of events, people and places which you don't actually have to create or depict (Skolnick, 2014). As a result, environmental storytelling can be used to give the player the sense of being part of a larger world than is shown in the game itself. As also described by Jenkins, environmental storytelling can occur in one or more of four different ways. Firstly, spatial stories can evoke pre-existing narrative associations in the form of *evocative spaces*. Amusement parks have often been used as an example of this form of environmental storytelling, as they build upon pre-existing stories and allow visitors to enter these stories physically (Jenkins, 2004, pp. 123). Secondly, the concept of environmental storytelling relates to how a game provides a staging ground where narrative events are enacted. These enacting stories are held together by broadly defined goals and pushed forward by the character's movement across the map (Jenkins, 2004, pp. 124). In this sense, the plot is really dependent on how the game world is organized. As a third possibility, environmental storytelling can occur in the form of *embedded narratives*. In this sense, the game world functions as an information space, waiting for the player to discover separate pieces of information within this space (Jenkins, 2004, pp. 127). While enacted narratives are more general, pre-scripted stories that the player progresses through to beat the game, embedded narratives are of a more interactive nature and don't necessarily have to be found to progress. Finally, environmental

storytelling can occur in the form of *emergent narratives*, which are little stories that occur during gameplay that are not pre-structured or pre-programmed in any way (Jenkins, 2004, pp. 128).

Methodology

Research design

Two different, qualitative research methods have been used to analyse the content of *God of War*. First, an auto-ethnography has been conducted while collecting the data. As described by Carolyn Ellis, Tony. E. Adams and Arthur P. Bochner, an auto-ethnography seeks to describe and systematically analyse personal experience in order to understand cultural experience, and as a method, it is both a process and a product (Ellis, C., Adams, T.E. and Bochner, A.P., 2011). As the name would suggest, the method is a combination of an autobiography and an ethnography. As a result, the researcher can write retroactively and selectively about past experiences, while also studying the common beliefs and values within a culture, subsequently becoming a participant observer (Ellis et al., 2011). Summarizing, the method enabled me to write retroactively and selectively about epiphanies that occurred during gameplay and subsequently, to analyse these events.

The auto-ethnography was the main approach for this research, as it did provide me with an opportunity to critically reflect on my role as the player of the game. For instance, I was able to make sense of my position as participant and observer in the game world. This also is the main source of data. It is also a method that could potentially evolve during the research itself, making it a flexible tool for data collection.

Data collection

Data collection consisted of recording my gameplay of *God of War*, making use of the recording capabilities of the Playstation 4 Pro, while also writing down preliminary findings during the gameplay. The importance of playing the game that is the object of research has been previously established by scholars like Aarseth (2003). For instance, if the researcher in question has not played the game, it can create severe misunderstandings about aspects of a game while conducting the research itself (Aarseth, 2003, pp. 3). Even when the game is observed by the researcher, the exploration and interpretation of rules cannot be fully grasped, as non-players don't know how to distinguish between functional and decorative sign elements in a game (Aarseth, 2003, pp. 3). Therefore, informed game scholarship has to involve play, even when the researcher decides to focus on another players' gameplay. Studying games involves interacting with the game rules and exploring the possibilities created by these rules (Juul, 2011).

Aside from this practical justification of why play should be incorporated in the research process, there is also one regarding the creation of meaning in games. As Kücklich (2002) points out, observing a game necessarily entails influencing it. A game has to be played to be understood, and playing a game implies making choices other players would not necessarily make (Kücklich, 2002).

There is also no ideal player, as the creative interaction with a game's rules is essential to the medium. Because of these facts, Kücklich (2002) would argue that it is not possible to grasp a game's meaning, without taking the specific details of the player context into account.

Sampling

Formatted: Font: Bold, Italic

As *God of War* is a fairly lengthy game that could be defined as a semi-open world, it was important to structure and sample the recorded gameplay. As a result, the recording software of the Playstation 4 Pro was used to structure the recorded gameplay in episodes of an hour each at the most. This was fairly simple to do, as you can easily save clips of gameplay on the console using the Share-button. Gameplay itself consisted of a complete playthrough of the main story of *God of War*. This included completing Kratos' and Atreus' story and doing a number of different side quests (as these commonly convey interesting narratives) when these were encountered naturally. I did not search for side quests and other minor activities actively, since I knew that this would make the data set overly extensive. I expected a total amount of approximately 30 different episodes of gameplay, but this amount eventually differed from the actual amount, as the skill and overall playstyle of the player can influence the time it takes to complete the game. Since I am a relatively experienced player of the game, I suspected that completing the game would take relatively less time than it normally would.

After recording the content and dividing it in different episodes, the filmed content was directly extracted from the console to a computer, allowing for further modification where necessary. This sampling process essentially follows Flick's logic of constructing a corpus to set up data for analysis. Instead of making a selection of persons or situations in order to produce data, already existing materials are taken as a selection for analysis (Flick, 2007, pp. 8). In this case, sampling is strongly based on discovering the right exemplars within the constructed episodes for answering the research question (Flick, 2007, pp. 8).

The data collection resulted into a collection of 21 videos, ranging in lengths between 32 to 58 minutes. This variation in times was achieved due to the fact that I stopped videos at opportune moments to make sure that individual videos were consistent and that the endings were not too abrupt. As a result, videos often stop after the completion of a quest, cut scene or other narratively relevant event. However, because of how episodes had to be constructed while collecting the data and how the episodes had to be primarily focused on the game's main story, but also because of how in-game events related to embedded learning principles would be the main focus for the subsequent analysis, sampling was also conducted within the chosen material for analysis. This is typically the next step of sampling after having built a corpus of data (Flick, 2007, pp. 8). Because of this, I'm enabled to select specific examples within the corpus of data that relate to the implementation of learning principles in God of War, opening these examples up for further analysis

Data analysis

Formatted: Font: Bold, Italic

Formatted: Font: Bold, Italic

Formatted: Indent: First line: 1,25 cm

After recording the gameplay and writing down preliminary findings, a thematic analysis of the gameplay content was conducted. As a result, the research consists of a holistic analysis of the game *God of War*, focusing on how the game is consumed during the digital auto-ethnography, while subsequently conducting thematic analysis on the game's content – dialogues, characters, actions, game mechanics, the narrative and game's instances of world-building.

Thematic analysis can be seen as a method for identifying, analysing and reporting certain patterns within broader data sets (Braun & Clark, 2006). Data resulting from the method can be described in extended detail, but the method also allows for further interpretation of various aspects of the research topic (Boyatzis, 1998). Three key aspects of thematic analysis should be taken into account to successfully use the method. First of all, the researcher should reflect explicitly on what can or cannot be seen as a theme within the dataset. While Braun & Clark state that rigid rules should not be formulated, as some flexibility on the case should be maintained, it is nevertheless important to reflect on the process of identifying themes. For this analysis of *God of War*, themes that are related to learning principles were the main focus, while the preliminary findings during the data collection (filming) would be of a more general nature.

Secondly, the "keyness" of a theme is not necessarily dependent on any quantifiable measures. As a result, it is important to ask how a certain theme captures something important related to the research question and sub-questions (Braun & Clark, 2006, pp. 10). Because of this measuring of keyness of present themes, the prevalence of themes can be varied in the analysis. Finally, it is important for the researcher to determine whether a thematic analysis on the entire data set should be conducted, or if he or she will focus on a specific group of themes within the broader data set. While the first method guarantees a certain richness of themes used, the latter provides the researcher with a degree of complexity that would otherwise be lost. As stated earlier, a more general approach to themes was used during the data collection, while during the actual thematic analysis, the main focus was on themes related to learning principles in *God of War*.

While the game's content functioned as the primary source of data, secondary sources on the game's production were used when applicable. For example, on May 10th, 2019, Playstation released the documentary *God of War: Raising Kratos* in collaboration with Santa Monica Studio. This was a full-length documentary of two hours, focusing on the entire production process of *God of War*. This documentary was very useful as a secondary source of data, as it focused on the game's production. By using this film as secondary source, present themes in the game's content could be related to the production process of the game. As a result, the holistic view on the game was significantly enhanced.

Operationalization

After collecting the entire corpus of data it was summarized and catalogued using an Excel file, using separate sheets for each separate chapter of collected video content. This amount of data can be found in the Appendix of this research. Each separate chapter has been organized in the exact same way. First, a column with the five general themes relating to learning principles in God of War is listed in each separate sheet. These are also highlighted by colours, making the relatively large datasets easier to read and interpret. Following that, the rest of the dataset has been organized using four columns; “Learning principles”, “Categories”, “Sub-categories” and finally “In-game events”. The column for in-game events indicates the specific events that were encountered during gameplay that in some interesting way or form relate to how learning principles are implemented and embedded in God of War. These are also listed in the order in which they were encountered, essentially enabling the researcher to analyse the order in which events related to the implementation of learning principles occur.

Following this, the column of learning principles indicates which learning principle of Gee’s framework can most easily be traced back to the corresponding in-game event. These learning principles include Gee’s concepts of co-design, customization, identification, the manipulation and distribution of knowledge, adding to expertise, pleasant frustration, expertise by repeated cycles, on-demand information, system thinking and meaning through action images. The meaning of these concepts has been elaborated on extensively in the theoretic framework of this thesis. Subsequently, the column of categories indicates which part of the game’s design is most interestingly affected by what occurs in the corresponding in-game events, potentially focusing on game mechanics, the narrative or the game’s world-building.

Finally, the column of sub-categories can be seen as elaborations of the previous column. To do this, Shaw’s model of affordances has been used when in-game events primarily related to the game’s mechanics and Jenkins’ and Wolf’s conceptualisations of environmental storytelling and world-building when in-game events related more strongly to the game’s world-building.

Reliability and validity

Formatted: Font: Bold, Italic

Formatted: Font: Bold, Italic

The concept of reliability, at its’ core, relates to the consistency of analytical procedures, including accounting for personal and research method based biases that may influence the findings (Noble & Smith, 2015, pp. 2). The method and the subsequent analysis resulting from it can be qualified as systematic, but it can still be hard for other researchers that also want to use the method to determine which in-game events need to be included in the dataset, effectively reducing the method’s reliability. To overcome this problem, the researcher could use three questions that can be derived from Gee’s model of learning principles. The answers to these questions function as the starting points

for effectively selecting and cataloguing interesting in-game events. Firstly, the researcher should question whether the player is being empowered in any way or form during certain in-game events. Secondly, the researcher can question whether the player is being encouraged or helped to solve a specific problem. Finally, the researcher can question whether the player's overall understanding of specific aspects of the game is being developed because of what happens during the in-game event. Typically, one of these questions can be answered with a clear "yes" when an in-game event relates to the implementation of learning principles. However, as the amount and nature of interesting in-game events that are encountered during gameplay heavily rely on the player and how the game is played, the researcher should clearly illustrate how the game is going to be played beforehand to avoid the generation of unreliable data.

Finally, the corpus of data generated using the methods described earlier can also be qualified as valid. The concept of validity relates specifically to the precision in which the findings accurately reflect the data (Noble & Smith, 2015, pp. 2). In other words, it is the degree by which can be measured whether the research question could be effectively answered using the dataset in question. While using the dataset in question, not only can the specific forms of learning principles be catalogued and linked to corresponding in-game events, but the different ways in which they are embedded in the game can subsequently be identified using the aforementioned categories and sub-categories. The researcher can even create timelines based on the catalogued in-game events, making it possible to identify which learning principles are typically embedded as a combination or separately.

Analysis

As a result of the thematic analysis that was described above, five different main themes were identified that related to how God of War's learning principles are embedded and presented in the game. The themes found were how the game teaches the basics of its' mechanics through tutorials, how Atreus and other important NPC's can function as teachers to Kratos and the player through the usage of embedded narratives and encyclopaedic impulses, how Kratos can function as a teacher to the player and/or Atreus through the principle of identification, how Atreus or other NPC's can function as guides that stimulate the player's system thinking and finally how the player can be stimulated to learn instinctively through the principles of co-design, customization, system-thinking and adding expertise through repeated cycles. Examples of these themes can be found in Appendix I of this research.

Tutorials

Firstly and fittingly, the game attempts to teach the basics of the game to the player using visual and textual prompts with necessary information. This is one of the more basic ways that the game developers have used to embed learning principles in the game, as these prompts function as on-demand tutorials to guide the player to success. These tutorials always relate to the game's most basic mechanics, ranging from explanations on how to move the character Kratos to how to attack an enemy while it is grabbed. As a result, these visual and textual prompts can also be described as identifications of the game's most basic perceptible affordances.

Also, these in-game events always relate to Gee's learning principle of on-demand information, one of the learning principles related to problem-solving. As the player encounters a certain new situation, the game presents him or her with the necessary information to move forward. Naturally, this occurs considerably more in the opening section of the game, as the players knows little to nothing about the game yet. In the case of God of War, the first three chapters of the game contain 39 of the 85 in-game events that relate to this established theme. Almost half of the total amount of tutorials is concentrated in the first three chapters of the game, which is a surprisingly large amount, even when considering the nature of tutorials in games.

After the first three chapters of the game, these visual and textual prompts occur at key moments in the game's narrative to guide the player, but also when the player finds a new tool to explore the world in ways that were previously established as impossible. I found this latter implementation of tutorials especially interesting, as a contrast between the tutorials' on-demand nature and the way they occur can be identified. This contrast is achieved as a result of the game's "Metroidvania-based game design". As the name suggests, this is a subgenre of action adventure games that was initiated by game series like *Metroid* and *Castlevania*. These games feature large,

interconnected worlds to explore while also limiting the player's movement through it by using obstacles that can only be overcome after having acquired certain special tools (Nutt, 2015). In the case of God of War, these special tools include *Light Arrows*, *Shock Arrows*, *the Blades of Chaos* and *the Winds of Hel*.

As a result, these games can guide players through a large, potentially open world in a fairly linear way. Because of this approach to the game world's design, tutorials on how to overcome certain obstacles are often delayed until the player acquires the necessary tool to do so. Specifically, the game often presents the player with obstacles that they cannot do anything about yet, while only after having acquired the tool to overcome these obstacles the game will present the player with a tutorial. The implications of the game's Metroidvania-based world design for God of War's implementation of learning principles will be discussed in further detail when talking about the other general themes that were identified during the thematic analysis.

Finally, the game's tutorials continue to occur regularly after the first three chapters of the game when the player undergoes certain actions that typically don't occur too often. For example, the game presents the player with visual and textual prompts every time that an enemy is grabbed that can be attacked while grabbed. For reference, enemies can be grabbed using R3 after their Stun Meter has been filled, which occurs more quickly using Atreus' Light Arrows or Kratos' Bare-Handed Combat. If these combat options are not used or to a small degree, the amount of times that the player will be able to grab an enemy will be drastically reduced. Because of this, the amount of times that a player will receive tutorials related to grabbing is heavily dependent on the player's playstyle. Personally, I used a lot of grabs while playing the game, since it is a very powerful ability. This resulted in 17 of 85 visual and textual prompts in my playthrough of the game being related to how to attack enemies while they are grabbed. A second example of how the playstyle of the player influences the amount and form of tutorials that are encountered after the first three chapters of the game are player reminders. These visual and textual prompts can occur when a player takes too long solving a puzzle, continues to fail at using basic mechanics of the game or even when the player forgets to spend his or her experience points to buy skills in the Skills-section of the main menu. Since I had some prior knowledge about the game due to having played the game numerous times, I only received one combat reminder about how to do Quick-turns, as I never did this in the game after the intial tutorial in chapter 2. However, I did encounter numerous reminders to spend my experience points, since I had been holding back too long on buying new skills on multiple occasions, because at these times I wanted to buy specific skills that required a relatively high amount of points.

Summarizing, God of War's tutorials do not only occur at the start of the game and at fixed moments in the game's narrative, but continue to occur in the later parts of the game, even as direct responses to the player's actions. However, more often than not these visual and textual prompts function in a basic way, as was described by Gee, to explain the mechanics of the game to a beginning player, presenting information on-demand. While Gee's learning principle of on-demand information

is clearly prominent in God of War, the occurrence of tutorials is often delayed because of the game's metroidvania-based world design, creating an interesting contrast between these two aspects of game design.

Embedded narratives and encyclopaedic impulses

Next up I will elaborate on the second main theme of how God of War embeds and implements its' learning principles. This second main theme focuses on the principle of how Kratos and the player are taught about the world and its inhabitants by Atreus, Mimir[1] and possibly other NPC's (Non-Playable Characters).

There are two common ways in which this theme appears in the game. Firstly, the game uses embedded narratives through Atreus' usage of the journal to teach Kratos, as well as the player, about the world and its inhabitants. As the player encounters new enemies, Atreus will make a journal entry about them after defeating them. These journal entries can subsequently be found in Journal-section of the main menu of the game. This first part of a journal entry initially counts as a part of the game's world-building, as these first journal entries describe the enemies from a perspective of how they fit in the world. However, as the player progresses, Atreus will keep including new journal entries about enemies and NPC's that are already known to him and Kratos. These journal entries mostly describe tactics that can be used to exploit enemies' weaknesses and to avoid their strongest moves. In this regard, the journal entries focus more on the game's mechanics and teaching the player/Kratos about how to best tackle certain combat situations. However, they also relate from a narrative perspective to Atreus' development as a warrior, as these entries are Atreus' personal reflections and observations of known enemies and NPC's. As a result, the game mechanic of collecting and using journal entries is clearly rooted in the game's narrative.

It is also clearly noticeable how these journal entries always function to help the player to solve problems through the usage of on-demand information, which relates to Gee's corresponding formulation of this learning principle. However, while Gee defines this kind of information in games by how it appears to be on-demand or "just in time" (Gee, 2005, pp. 11), the addition of journal entries in God of War occurs shortly after the events. This is done because of the game mechanic's earlier mentioned connection to the game's narrative, as Atreus can't make journal entries about events that have not occurred just yet.

Of equal importance is how this second theme in the game stimulates the player's system thinking. As the game progresses, every separate journal entry becomes an elaborate guide to how to

[1] In *God of War*, Mimir is presented to the player as the greatest ambassador of the gods, who eventually ends up being imprisoned by Odin himself as he found that Mimir became less loyal over the course of time. He started to represent the interests of all gods instead of just Odin's. Because of his extensive knowledge of the game world, Kratos and Atreus free Mimir from his bonds and take him along on their journey.

Formatted: English (United Kingdom)

Formatted: Font: 9 pt, English (United Kingdom)

Formatted: Font: 9 pt, Italic, English (United Kingdom)

Formatted: Font: 9 pt, English (United Kingdom)

Formatted: English (United Kingdom)

take down certain enemies, which supports specific ways to fight during combat. -For example, in the event that a player encounters three different kinds of enemies, the player will know how to fight each separate opponent, but the player will also how to prioritize fighting one enemy instead of another. Because of the journal entries, the player can establish the biggest threats, enemies that have to be defeated early on and enemies that can be left alone for the time being. As a result, these embedded narratives help the player get a feel for the rules of the game and its world (Gee, 2005, pp. 14), while maintaining the player's sense of immersion (Jenkins, 2004, pp. 127)

Embedded narratives can also be encountered in the form of collectibles. While the first example of embedded narratives in the game focuses more heavily on combat situations and system-thinking, this second example goes all in on the world-building aspect of the game. Like the first example, Atreus will add journal entries about the collectibles. But even in-game, remarks will already be made by Atreus about what the collectibles mean and how they fit within the world of God of War. The best example of this is how the player can find Jotün shrines in the game, which are a kind of murals that depict certain stories that are part of Norse mythology.

Figure 1: Finding a Jotün Shrine

However, instead of being a vague part of mythology, which would make the reliability of the events depicted questionable at best, these murals depict history in the case of God of War, making them important pieces of information to remember to understand the entire story and world of the game. This importance of remembrance becomes even more clear when considering how some of these "readable collectibles" can hint towards situations that will be encountered soon afterwards. The best example of this is how the player can find a story about Hraezlyr, which according to Atreus, means "Terror". In the journal entry, the player can read about this certain "Terror of the Mountains" that plagued the Giants while they still lived there. Soon after finding this collectible, the player actually encounters the Terror, which turns out to be a huge dragon that the player has to fight during a following bossfight. In this case, collectibles can be regarded as tips for the player, enabling him or her to make appropriate preparations. Because of how these tips do not necessarily have to be followed up on, the player does not feel like being drug around by the neck, essentially maintaining the player's sense of immersion (Jenkins, 2004, pp. 127).

Secondly, this main theme can occur in the form of encyclopaedic impulses, as defined by Wolf. These impulses always occur in the form of on-demand information, often filling relatively boring sections in the game like sailing in the boat or climbing big stretches of mountain with interesting stories about the game world and its inhabitants. This part of the game's world-building occur more in the latter half of the game's story, as Kratos' and Atreus' bond improves and they find Mimir, the ambassador of the gods. This character will provide Kratos and Atreus with interesting stories about the world's history after being freed from the tree he was bound to. More importantly however, these stories often fill in the gaps that are left by the Jotün shrines that are encountered by the player as collectibles, and sometimes Mimir even hints towards what the player is about to encounter. Because of this, the encyclopaedic impulses present within the game work in a similar way as the embedded narratives, creating a consistent way in which the player's system thinking is stimulated through the game's world-building.

Interestingly, these encyclopaedic impulses do not halt the game's narrative, which contrasts how Wolf defines the concept. Wolf explains these impulses as halts in a narrative to elaborate on its' world and inhabitants (Wolf, 2013, pp. 30). In the case of God of War, these impulses do not halt the overall narrative, but fill the gaps in between exploration and narrative sequences, as they are typically included during exploratory sections that are less interesting and mechanically taxing to the player.

As the game progresses, the amount of embedded narratives encountered is taken over by an exceedingly large amount of encyclopaedic impulses presented to the player. This seems to happen as soon as the player finds and takes Mimir along on the journey. This is not only a logical result from a narrative standpoint, as Mimir is freed by Kratos because of his knowledge about the world and how they can get to Jotünheim, but also from a perspective that focuses on the game's mechanics. This is because of the fact that the game has a limited amount of enemies to fight, meaning that there is a limited amount of journal entries to unlock about them. As a result, the total amount of embedded narratives encountered naturally decreases over time and is concentrated in the earlier part of the game. Because of how the amount of encyclopaedic impulses presented to the player increases as soon as Mimir is freed (In this case, after 15 hours of gameplay time), the player continues to learn about the game world and its inhabitants despite of the accumulated progress in the Journal-section of the menu.

Kratos as a teacher

The third main theme that was encountered during analysis was how at certain times in the game Kratos functions as a teacher to Atreus and the player. In all of these cases, these moments are key points in the game's narrative, providing the player with valuable insight on Kratos' values and personality. Most of these events can be linked to Gee's learning principle of identification. Through the ability to identify with Kratos, the player can potentially learn about broader subjects like

fatherhood and finding a way to control anger, and because of the fact that these subjects are broader and identifiable, this learning principle can in turn be effective. Good examples of this are how Kratos warns Atreus that anger is a dangerous thing and that you can get lost in it, but also how he tells him that only a parent can know the pain of losing a child. This second example however is more closely linked to how players can learn through the principle of providing meaning through action images. While the problem of anger and controlling it is more closely connected to Kratos' personal story, the loss of a child is a theme that many people can personally relate to, making it more connected to this second learning principle – providing meaning through action images. These two learning principles are hard to separate in God of War, as most of the key moments in the narrative are based on Kratos' and Atreus' personal story while also incorporating broader societal themes.

However, there are also numerous occasions where these teaching moments are more light-hearted, focusing on the smaller and more insignificant problems that can be encountered when teaching and raising a young child. Kratos will often call out to Atreus for running too far ahead, being too hasty and for talking back to him in a disrespectful manner. Parenthood and family in general are the central narrative themes in the game and this can be noticed at any point in the game. From this perspective, the story is not only about Kratos and Atreus, but it is also about how the dwarven brothers Brok and Sindri fix their relationship, and how Freya and Baldur end up doing the exact opposite in their mother-son relationship. Before the events of the game, the goddess Freya blesses her son Baldur by making him invulnerable to all threats. However, this also result in him not being able to feel anything anymore. Because of how Baldur resents his mother for this curse and because of how she is not willing to undo this spell, the relationship between these characters worsens as the game progresses. All of these characters' individual relationships develop over the course of the game and portray parallels and differences when compared to Kratos' and Atreus' relationship, emphasising key narrative moments in the game even further.

Aside from these key narrative moments, the main theme of how Kratos can function as a teacher also can be found during the game's combat and puzzle-based scenarios. Kratos will comment on how Atreus is doing during these intense fights, while also making remarks about his resourcefulness when he helps solving a puzzle. More often than not, these moments are scripted, particularly at the start of the game when Atreus has not had a lot of combat experience yet. However, as the game progresses, these moments will become less narrative-focused and scripted, focusing more on how much and how good the player uses Atreus during combat. These moments are based on the learning principle of gaining expertise by repeated cycles, which is a learning principle that will be discussed in more detail during the elaboration of the final two main themes in the game.

Up to this point, three main themes have been discussed. While these themes appear to be of quite different natures, a clear parallel can already be identified. Namely, each main theme that has been identified experiences at least one clear shift when it comes to how it is embedded in the game.

The visual and textual prompts that explain the game's mechanics shift from being basic tutorials in the first three chapters to reminders of how the player can act in specific uncommon situations and how the player should not forget to spend XP in the Skills-section of the menu during the rest of the game. The way in which the player and Kratos are taught about the world and its inhabitants by Atreus, Mimir or another NPC, the game's main tool for world-building, shifts from being implemented in the form of embedded narratives to mainly being encyclopedic impulses. Thirdly, the way that Kratos can function as a teacher during combat and solving puzzles shifts, as these moments become less scripted and narrative-focused as the game progresses. However, the narrative side of this theme continues to be embedded in a consistent way, as moments in the game are portrayed that enable the player to identify with Kratos' personal values, as well as enabling the player to recognise situations related to themes like parenthood and being part of a family that are more generally relatable and identifiable. Summarizing, it seems that learning principles that are related to the narrative of the game are implemented consistently throughout the whole game, while the way that learning principles that relate to the game's mechanics and tools of world-building are implemented shifts considerably.

Atreus as a guide

The fourth theme relating to the learning principles in the game is how Atreus, Mimir or other NPC's can guide the player/Kratos on how to move forward and what to do next. While this theme is one of the less frequently occurring themes in the game, it does occur in various forms. Firstly, the player can be guided to the next point of interest of the journey by Atreus or another NPC. This mainly occurs when the player reaches a new location, making the navigation of this new location easier as a result. This on-demand information can lead to the start of a puzzle, the next explorable area or can even remind the player of certain landmarks that have previously already been encountered. Examples of this are how Atreus leads Kratos/the player to the boat when it has moved away, how he leads Kratos back to the bridge after falling through it in chapter 3, and how he notes that they had already encountered the door that could not be opened in Alfheim. These are specific examples of how the game uses on-demand information to drive the narrative forward, framing the entirety of Kratos' and Atreus' journey as one, big enacted narrative, as defined by Jenkins. However, the player can also be guided to specific chests and collectibles in this way, which means that this form of on-demand information also has a more mechanical side to it.

These remarks by Atreus or other NPC's can also occur to stimulate the player's system thinking, specifically when considering how Atreus can guide the player through the Lake of the Nine, the biggest area in the game. This area evolves over time, as the World Serpent shifts his weight and lowers the water of the lake after key narrative events, enabling the player to explore more parts of the area. This happens numerous times in the game. Because of how the player's disability to explore the area is cured step by step, the player is guided through this relatively open area in a linear way. In this

context, Atreus and other NPC's can remind the player of this game mechanic, prompting him or her to start exploring the world again and taking a step back from the game's main narrative. This is the second clear example of Metroidvania-based game design in God of War that stimulates the player's system thinking.

Atreus can also guide the player/Kratos during combat scenarios. In these situations, Atreus can guide the player's attention to specific enemies and other dangers. For example, Atreus can hint to how an enemy is about to attack, but he can also remind the player of how an enemy is ready to be grabbed. Aside from these instances that relate to Kratos' actions in combat, Atreus can also guide the player to let him shoot arrows and he can indicate when is ready to shoot. Specifically, when the player tries to shoot too often or when Atreus is not used at all during combat, Atreus will tell the player. As a result, the player is taught how to use Atreus in combat while attempting to do so. In specific examples, Atreus can teach the player how to tackle difficult enemies while fighting them. The best examples of this are how he guides the player while fighting Trolls and Stone Ancients, which are the most common mini-bosses of the game. During these fights, Atreus will often indicate the bosses' strengths and weaknesses to help Kratos. He will even let the player know when the boss uses a move that is specific to that particular enemy archetype. This is really useful, as the player will often encounter these mini-bosses, and while they often look very much alike, they tend to use these special moves frequently. By letting the player know about a boss' upcoming attacks, the player learns about how to fight these bosses while doing so. Again, this theme is an example of how the game stimulates the player's system thinking in various ways. Summarizing, the game can help the player out through the usage of on-demand information. However, because of how it is framed as Atreus helping out Kratos, this way of teaching does not break with the player's sense of immersion. In this specific example, on-demand information works in a similar way when compared to how embedded narratives are implemented in the game.

Finally, the way that the player is guided by Atreus and other NPC's can reflect the progress that the player has currently made through the game's narrative. There are two specific examples that I'd like to elaborate on to illustrate this fact. The first example occurs in the earlier hours of the game, when Kratos goes into the light of Alfheim and leaves Atreus alone for just a moment. When he returns, it turns out that he has been away for a long time, indicated by the amount of dark elves that Atreus has killed on his own. For the rest of the journey through Alfheim, Atreus is behaving angrily towards Kratos, as he had previously promised to Atreus that he would not leave him alone ever again. This anger is clearly reflected in the way that he guides the player through the area. For example, after he has indicated the start of a puzzle, Atreus gets annoyed when the player starts to take too long to complete it. He even notes how the route Kratos is about to take is pointless when the player goes into the wrong direction.

A second example is how Atreus behaves after he learns that he is a god in the second half of the game's narrative. At this point in the game, Atreus has become arrogant and even cruel, as he does

not listen to Kratos anymore and he even kills Modi for fun. This is clearly reflected by how Atreus says “whatever” every time that the player wants him to shoot arrows during combat and exploration. When Kratos asks Atreus where to go next, Atreus responds by saying “Were you talking to me? I thought you didn’t like my tone.” Finally, Atreus attacks enemies on his own, and even uses his Runic Summon during combat without the player commanding him to. At this point in the game, Mimir takes over from Atreus and guides the player to the next location to go, as Atreus does not help the player anymore. Because of this it can be stated that the way that on-demand information is being presented to the player is deeply rooted in the game’s narrative.

Summarizing, this fourth main theme related to learning principles in the game not only focuses on providing the player with on-demand information to help the player progress through the game world, essentially framing the whole story as one big enacted narrative, but it also strongly relates to how the player’s system thinking is stimulated during combat and puzzle solving. Especially in this second case, the state of the narrative is constantly reflected by how the player is guided. Also, the execution of this theme is heavily dependent on the state of the game’s narrative, as the presentation of these learning principles through this theme reflect the progress that the player has made through the game’s narrative.

The player as a teacher

The fifth and final main theme related to the implementation of learning principles in God of War is how players are stimulated to learn about the game’s mechanics, world and narrative instinctively without guidance or input from any of the characters in the game. This is one of the most consistently present themes during the game, as the player is consistently prompted to learn about the game’s mechanics in an instinctive way. There are numerous examples of how this can occur during gameplay.

Firstly, the player is stimulated to instinctively structure their own learning process related to combat as they have to decide for themselves which skills to unlock in the Skills-section of the menu. As is the case in many games, the player earns experience points as he or she progresses through the game, which in turn can be spend to buy skills for Kratos and Atreus. While the amount of available skills to unlock is limited at first, the player always has to choose between different skills. These choices that the player makes not only have a direct impact on the way that combat scenarios typically occur, but also tend to determine the player’s playstyle during the course of the game. This effectively means that the player’s choices regarding the selection of skills are a clear example of how the learning principle of co-design can be present in games. This is not only the case during the earlier sections of the game, when the amount of unlockable skills is relatively high, but also in the latter parts of the game as the player typically can’t unlock all the skills before the narrative of the game is

finished. Also, the game developers have made sure that there are always new skills to unlock, as new unlockable skills are presented to the player as soon as certain key points in the game's narrative are reached. At these points in the game's narrative, the player is typically presented with upgrades for Kratos' Leviathan Axe and Blades of Chaos and Atreus' Talon Bow, which unlock the possibility to buy new, stronger skills. As a result, the player is only guided during their learning process of the game's combat mechanics to ensure that there are new skills to unlock in the game at any point in time.

The second example of how the player can learn the game's mechanics instinctively is through the customization of Kratos' and Atreus' armor, weapon pommels, enchantments and talismans, effectively influencing their characters' statistics as a result. There are six main statistics in the game. Firstly, *Strength* influences the damage that Kratos deals. *Vitality* indicates how much damage Kratos can take before dying. *Defense* is a statistic that in turn relates to how much the damage that is taken by Kratos is effectively reduced as result of equipped armor. *Runic* indicates how effective Kratos' and Atreus' runic moves are. The fifth statistic of the game, *Cooldown* indicates the length of the cooldown of runic attacks after performing them. Finally, *Luck* indicates the chance that the player receives valuable collectibles after combat scenarios. Each of these statistics can be manipulated by the specific armor pieces, enchantments, weapon pommels and talismans that are equipped by the player, effectively enabling the player to customize their learning experience even further than unlocking new skills already allowed. Armor pieces can be found naturally during the course of the game, but most of the available armor pieces in the game have to be purchased at the Dwarves' workshop. Incidentally, this is also the place at which the player can upgrade Kratos' and Atreus' weapons after reaching key points in the game's narrative, which in turn enables the player to buy new skills for both characters. While this is a clear example of how the learning principle of co-design is implemented in the game, the ability to customize the characters' equipped armor pieces, enchantments, weapon pommels and talismans is an example of the learning principle of customization is present in the game.

In addition, the way that the player can gradually gain expertise, which is one of Gee's learning principles related to problem solving, can be found inherently in numerous aspects of God of War's game mechanics related to combat. This is especially noticeable during fights against bosses, as there is only a limited amount of variety when it comes to the different kinds of bosses. More often than not, bosses are based on the archetypes of Trolls, Stone Ancients and Valkyries. Because of how bosses differ only slightly from other bosses belonging to the same archetype, the player can start building expertise in a gradual way.

As a result, each separate bossfight can be seen as preparation for the next fight. The best example of this is how each Valkyrie that is fought uses a slightly different set of moves compared to the others, which ultimately leads to the fight against the Valkyrie Queen, who uses a combination of all of these moves that were previously encountered. During this fight, the player is tested and has to

use all of his or her expertise that was gained during the previous fights. Another example of this is how the player gets to fight Baldur multiple times throughout the game's narrative. Baldur uses a limited set of moves during the first fight and introduces the player to being pinned on the ground. This particular game mechanic is further expanded on when the player gets to fight Baldur again on the back of a dragon. Ultimately, the player has to fight Baldur for the last time at the end of the game's narrative, during which Baldur uses an expanded set of moves as a result of having finally been freed from Freya's curse.

Aside from these examples that relate to the game's combat mechanics, there are numerous examples of how this main theme can be noticeable while exploring the game world. As the player progresses, he or she will naturally start to recognize certain aspects of the game environment that can be used in specific ways. For example, the player can start to recognize walls that can be broken or can even start to recognize when to use certain special tools like Light Arrows because of environmental motives that are always present in these cases. In the case of Light Arrows, these are the light crystals that can be shot to create a bridge of light. While these environmental motives are easy to recognize, it remains interesting to note how this nevertheless stimulates the instinctive recognition of aspects of the game world that can be interacted with. Specifically, this becomes even more interesting when the player does not possess the necessary tool for interaction just yet but already encounters these objects. This happens frequently in the game because of its Metroidvania-based game design, and as a result, the player will start to recognize these points in the game while exploring the world. This example of the player instinctively having to learn about the game's mechanics is strongly related to Gee's learning principle of adding expertise through repeated cycles. Only because of how much these environmental motives are encountered throughout the game's world, the player can reliably learn about these mechanics in an instinctive way. This instinctive way of learning is not only stimulated through this particular game on its own, but it is also taught to players by playing other similar games. The experiences in these games have "trained" players' eyes to look for elements in the environment that are potentially interactive at certain points during gameplay.

This logic of instinctive learning is also applicable to the puzzle solving sequences of the game. More often than not, the player will be guided to the start of the puzzle by Atreus, Mimir or another NPC. This was discussed in an earlier section about how Atreus and other NPC's can function as guides during gameplay. However, in numerous occasions this is not the case or only after a certain amount of time of not making any progress. In these instances the player has to instinctively find the solution to the puzzle, often having to use the easily recognizable environmental motives that were discussed earlier. A good example of this principle being present during puzzle sequences is the big puzzle that is encountered in Týr's Temple. At the start of the puzzle, the player could easily recognize that the Winds of Hel have to be used during the puzzle because of how recognizable the environmental motives related to this special tool are. Initially, the player will not receive any help while attempting to solve the puzzle. However, if this process is halted for too long, Mimir will start a

conversation with Atreus about the Winds of Hel, how they obtained it and how it should be used in this situation.

Summarizing, the player's ability to instinctively learn the game's mechanics related to combat, puzzle solving and exploration is constantly stimulated through the learning principles of system-thinking, customization, co-design and adding expertise through repeated cycles.

Conclusion

This research was started to answer the following research question: “How are learning principles implemented/embedded in the content of the game *God of War* (PS4)?” To answer this research question, I will first briefly summarize all of the main findings of the research, and how they relate to the research’s sub-questions. Afterwards, the theoretical implications of the research will be discussed. Finally, I will conclude by identifying limitations of the research, as well making suggestions for future research.

Summary

As a result of the thematic analysis, five different main themes were identified. These include the presentation of tutorials through visual and textual prompts, how Atreus, Mimir or other NPC’s can teach the player about this world and its inhabitants, how Kratos can function as a teacher, how Atreus or other NPC’s can guide the player through the game world and finally how the player can be stimulated to learn instinctively in specific scenarios.

The aforementioned tutorials were clearly concentrated primarily in the earlier sections of the game, providing the player with basic information on the game’s mechanics. However, based on the playstyle of the player, tutorials continue to be presented regularly throughout the game to an obviously lesser degree. The information that was presented to the player by Atreus, Mimir or other NPC’s about the world turned out to be the game’s main source of information for world-building, presenting the player with embedded narratives and later encyclopaedic impulses to teach the player about the game world during the less mechanically taxing sections of the game. Kratos functions as a teacher during the game’s narrative by providing insights into his character, enabling the player to identify with him while also presenting the player with more generally relatable themes like fatherhood which follow the logic of the learning principle of meaning through action images. As a fourth theme, Atreus or other NPC’s can guide the player during combat, while exploring or attempting to solve a puzzle by hinting at certain game mechanics, effectively stimulating the player’s system thinking. Finally, the player can be prompted to learn instinctively during combat, exploration and puzzle solving, which becomes more and more prominent as the player progresses through the game.

A number of other parallels and themes could also be identified as a result of the thematic analysis. Firstly, as the amount of tutorials decreased over time, the amount of instinctive learning that had to be performed by the player increased. A clear turning point that could be identified was the start of chapter 4, which marked the beginning of the player’s journey through the open world of the game. After this chapter, the amount of presented tutorials fully depended on the actions and playstyle of the player. In the case of the researcher, this resulted in a low but steady amount of presented tutorials

throughout the rest of the game. At the same time, the amount of instinctive learning required from the player increased until the end of the game. This part of the game's design seems to reflect the player's ability to naturally progress through the game after receiving the basic information about the game's mechanics.

Secondly, the learning principles of the game are generally presented in a consistent and clear way, as each of the main themes that are identified are presented to the player through a limited amount of ways. For example, tutorials are always shown through visual and textual prompts that pop up on the screen during gameplay, and world-building through Atreus and other NPC's always occurs in the form of embedded narratives and encyclopaedic impulses presented to the player at points in the game that are less mechanically taxing. When Kratos functions as a teacher to Atreus and the player, the themes of fatherhood, family and revenge are consistently used to teach the player during the game's narrative, focusing on identification and meaning through action images.

However, when the way that a learning principle is presented to the player changes, this occurs because the player has reached a key point in the game's narrative. Because of Atreus' illness, the player eventually receives the Blades of Chaos, which enables the player to further customize Kratos' gear and effectively grants more opportunities for co-design because of the newly added skill tree associated to the weapons. Because Kratos eventually frees Mimir to find the way to Jotünheim, world-building tends to be done in the game through the usage of encyclopaedic impulses by Mimir instead of embedded narratives found by Atreus. Finally, because of how Atreus eventually learns that he is a god, he starts to act cruelly and becomes arrogant. This results in Atreus not guiding the player and Kratos through combat scenarios, exploration and puzzle solving as he previously used to. As is shown in these examples, the presentation of learning principles in God of War is dependent on the current state of the narrative.

Finally, the game teaches the player about its mechanics in a gradual way, slowly but surely adding to the player's expertise during the course of the entire narrative. Because of this, Gee's learning principle of gradually adding to expertise is not explicitly present during specific in-game events, but is always inherently present to some degree. This can be argued because of how the player is gradually taught about all the aspects of combat and because of how puzzles become increasingly complex due to the necessary usage of multiple combinations of special tools like Light Arrows and the Winds of Hel. In addition, the fights against Baldur can be framed as one big learning process that stretches through the entire narrative, during which the player gradually builds up expertise to overcome Baldur at the end of the game. From this perspective, gradual learning is applied to the design of game mechanics.

On a concluding note, it can be stated that the learning principles of God of War are implemented in a clear and consistent way, but the presentation of these principles starts to differ after reaching key points in the game's narrative. As a result, it can be argued that, at all times, the learning principles of the game need to fit within the game's narrative.

Theoretical implications

This strong focus on a game's narrative is one of the main takeaways for how educational game designers should approach their games, as an engaging narrative is more often than not something that is lacking within these games. While these games are clearly primarily made for distinct learning purposes, an attempt should be made to prevent them from becoming overly "academized", like how it is discussed by Van Eck. Using the game God of War as an example, educational game designers should try to implement learning principles through the lens of how they would fit within the game's narrative and world, which naturally also need to be engaging to make this work.

As a result of the analysis, two clear contrasts were found when comparing the usage of concepts in the analysis to how they were presented in the theoretic framework. Firstly, the learning principle of on-demand information was occasionally implemented differently in God of War than how it was described in Gee's framework. While Gee describes the principle as providing information to the player "just in time", on-demand information in God of War tends to be provided just after the occurrence of the events associated to it. This was especially noticeable when analysing the implementation of journal entries in the game. While these were presented to the player after experiencing the events associated to them because of narrative reasons, it could also be argued that this way of implementing on-demand information forces the player to be more self-reflective, effectively adding an extra layer to the learning principle.

Secondly, the encyclopaedic impulses in God of War are not meant to halt the narrative, which slightly contrasts the way that Wolf defines the concept. In this game, encyclopaedic impulses occur and are implemented to make mechanically boring sections of the game, which are in this case sailing sections and climbing sections during exploration, more interesting. As a result, encyclopaedic impulses enrich the overall experience instead of halting it.

Finally, it can now be argued that if the discussed concepts are implemented differently to how they were defined in the original literature, it is done because of narrative-based reasons. On-demand information in the form of journal entries is presented as Atreus' way to reflect on his experiences, while encyclopaedic impulses mainly function to enrich the total narrative experience when it is most needed. Other than these two specific examples, this research strongly reinforces the theoretic importance of the frameworks that have been used, especially Shaw's framework, Gee's learning principles and Jenkins' concepts relating to environmental storytelling.

Limitations and suggestions for future research

As has been stated before, one of the biggest problems that is faced in education today is a lack of motivation among students. By using educational games that are made to teach specific,

distinct skills, and which attempt to do so by using learning principles that are rooted in the games' engaging narratives and worlds, this problem of lacking motivation among students could potentially be solved. However, to achieve this goal and to solidify if this is feasible, more research is needed. Specifically, I would start by researching two things. First, an attempt should be made to do research on more commercial narrative-based games like God of War to improve on the amount of data that has already been collected during this research. There are probably numerous other narrative-based games that implement and present their learning principles differently when compared to how this is done in God of War. There could even be clear parallels to be identified, further solidifying the claims that are made in this research. By researching these particular games, the framework of how learning principles are implemented in commercial, narrative-based games would be expanded, effectively providing educational game designers with more potential tools to improve on their games. Secondly, research should be done on how educational games could implement the tools that are presented in this research and which of these tools could be embedded in the educational games while still ensuring that the games' main goal of learning is maintained. This could be done by conducting research that includes user surveys, further exploring how players experience identified learning principles and which of these could be used effectively in education.

After these questions have been answered, educational game designers should become more successful at balancing educational value and entertainment in their games. This was one of the main problems that I aimed to tackle with this research. However, there are still other problems that are faced by these designers that have to be solved to further improve on the educational worth of their games. These not only include problems like the generally high development costs of games, but also the more practical ones like how educational games could be effectively implemented in the classroom. Despite these being clear issues, I am optimistic that solutions will be found to these problems, as researchers like Barr are already showing examples of how these problems can be tackled effectively. In these examples, specific games were used to teach limited, distinct sets of skills by presenting players with scenarios that could either solidify or contrast claims that were made in traditional learning sources that were also used in these classrooms. In the case of God of War, students could learn about Norse mythology and themes like fatherhood, family and revenge through the eyes of a Greek god of war and his son Atreus. Coming back to the problem of motivation in education, who wouldn't want to learn like that?

Literature

Aarseth, E. (2003). Playing Research: Methodological approaches to game analysis. *In Proceedings of the digital arts and culture conference*.

Barr, M. (2019). *Graduate Skills and Game-Based Learning: Using Video Games for Employability in Higher Education*. Palgrave Macmillan.

Boyatzis, R. E. (1998). Transforming qualitative information: Thematic analysis and code development. Thousand Oaks, CA: Sage.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.

Cardona-Rivera, R. E., & Young, R. M. (2013). A Cognitivist Theory of Affordances for Games. *In DiGRA Conference*.

CNN. (2005, April 7th). *Review: God of War, Zeus of adventure games*. Retrieved from https://www.webcitation.org/6CMKwLQYj?url=http://www.cnn.com/2005/TECH/fun.games/04/07/god.of.war/

Conway, S. (2019). Poisonous Pantheons: God of War and Toxic Masculinity. *Games and Culture*. https://doi.org/10.1177/1555412019858898

De Aguilera, M., & Mendiz, A. (2003). Video games and education: (Education in the Face of a "Parallel School"). *Computers in Entertainment (CIE)*, *1*(1), 1-10.

Djaouti, D., Alvarez, J., & Jessel, J. P. (2011). Classifying serious games: the G/P/S model. *Handbook of research on improving learning and motivation through educational games: Multidisciplinary approaches* (IGI Global), 118-136.

Ellis, C., Adams, T. E., & Bochner, A. P. (2011). Autoethnography: an overview. *Historical social research/Historische sozialforschung*, 12(1), 273-290.

Flanagan, M., & Nissenbaum, H. (2014). *Values at play in digital games*. MIT Press.

Flick, U. (2007). Sampling, selecting and access. In Flick, U. Qualitative Research kit: Designing qualitative research (pp. 25-35). London: SAGE Publications, Ltd doi: 10.4135/9781849208826

Gamespot (2013, March 7th). *Gamespot Reviews – God of War: Ascension.* Retrieved from https://www.youtube.com/watch?v=xN2FjUOBVEU

Gaver, W. W. (1991). Technology affordances. In *Proceedings of the SIGCHI conference on Human factors in computing systems*, 79-84.

Gee, J. P. (2005). Learning by design: Good video games as learning machines. *E-learning and Digital Media*, *2*(1), 5-16.

Gee, J. P. (2008). Learning theory, video games, and popular culture. *The international handbook of children, media, and culture*, 196-211.

God of War (2018). Santa Monica Studio, Sony Interactive Entertainment.

Hall, S. (1991). Encoding, decoding. *The Cultural Studies Reader*. London: Routledge. 90-103.

IGN (2016, July 29th). *How God of War Innovated Action-Adventure Games.* Retrieved from https://www.youtube.com/watch?v=PMJaH3yl-6E

Jenkins, H. (2004). Game design as narrative. *Computer*, *44*(53), 118-130.

Jenkins, H. (2012). *Textual poachers: Television fans and participatory culture*. London: Routledge.

Juul, J. (2011). *Half-real: Video games between real rules and fictional worlds*. MIT press.

Kücklich, J. (2002). The Study of Computer Games as a Second-Order Cybernetic System. *In CGDC Conference*.

Liarakou, G., Sakka, E., Gavrilakis, C., & Tsolakidis, C. (2012). Evaluation of serious games, as a tool for education for sustainable development. *European Journal of Open, Distance and E-learning*, *15*(2).

Nagy, P., & Neff, G. (2015). Imagined affordance: Reconstructing a keyword for communication theory. *Social Media+ Society*, *1*(2), 1-9.

Noble, H., & Smith, J. (2015). Issues of validity and reliability in qualitative research. *Evidence-based nursing*, *18*(2), 34-35.

Orvis, K. A., Horn, D. B., & Belanich, J. (2008). The roles of task difficulty and prior videogame experience on performance and motivation in instructional videogames. *Computers in Human behavior*, *24*(5), 2415-2433.

Playstation. (2016, June 14th). *God of War – E3 2016 LiveCast | PS4*. Retrieved from https://www.youtube.com/watch?v=ar59w0yrA_E

Playstation (2019). God of War: Raising Kratos https://www.youtube.com/watch?v=lJZWKBDXXFY&t=4530s

Prensky, M. (2003). Digital game-based learning. *Computers in Entertainment (CIE)*, *1*(1), 21-21.

Rama, P. S., Black, R. W., Van Es, E., & Warschauer, M. (2012). Affordances for second language learning in World of Warcraft. *ReCALL*, *24*(3), 322-338.

Ryan, M.L. (2009). From Narrative Games to Playable Stories: Towards a Poetics of Interactive Narrative. *Storyworlds: A Journal of Narrative Studies*, 1(1), 43-59.

Salen, K., Tekinbaş, K. S., & Zimmerman, E. (2004). *Rules of play*: Game design fundamentals. MIT press. https://gamifique.files.wordpress.com/2011/11/1-rules-of-play-game-design-fundamentals.pdf

Sánchez, J., & Olivares, R. (2011). Problem solving and collaboration using mobile serious games. *Computers & Education*, *57*(3), 1943-1952.

Scully-Blaker, R., Begy, J., Consalvo, M., & Ganzon, S. (2017). Playing along and playing for on Twitch: Livestreaming from tandem play to performance. In *Proceedings of the 50th Hawaii International Conference on System Sciences | 2017*.

Shaw, A. (2017). Encoding and decoding affordances: Stuart Hall and interactive media technologies. *media, culture & society*, *39*(4), 592-602.

Shaw, A. (2011). "He could be a bunny rabbit for all I care": Exploring identification in digital games. In *Proceedings of DiGRA 2011 Conference: Think Design Play*.

Sicart, M. (2008). Defining game mechanics. *The International Journal of Computer Game Research*, 8(2).

Skolnick, E. (2014). *Video game storytelling*: What every developer needs to know about narrative techniques. Watson-Guptill Publications.

Slovak, P., Salen, K., Ta, S., & Fitzpatrick, G. (2018). *Mediating Conflicts in Minecraft*: Empowering Learning in Online Multiplayer Games. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, 1-13.

Spring, D. (2015). Gaming history: computer and video games as historical scholarship. *Rethinking History*, *19*(2), 207-221.

Squire, K. (2003). Video games in education. *Int. J. Intell: Games & Simulation*, *2*(1), 49-62.

Uhlmann, E., & Swanson, J. (2004). Exposure to violent video games increases automatic aggressiveness. *Journal of adolescence*, *27*(1), 41-52.

Van Eck, R. (2006). Digital game-based learning: It's not just the digital natives who are restless. *EDUCAUSE review*, *41*(2), 16.

Wolf, M. J. (2014). *Building imaginary worlds: The theory and history of subcreation*. London: Routledge.

Wainwright, A. M. (2014). Teaching historical theory through video games. *The History Teacher*, *47*(4), 579-612.

Appendix I: Code book

During the analysis, five different main themes were identified. To elaborate on how was coded during the analysis, an example of how each of these themes are identified and how they relate to different identified learning principles, categories and sub-categories will follow below. These are some of the most commonly encountered situations that relate to the game's presentation of learning principles, and because of this, these are only a couple of examples of how learning principles can be embedded in *God of War*. All of the images shown below were captured during gameplay. Important aspects of the images have been highlighted with differently coloured borders to support the example descriptions when necessary.

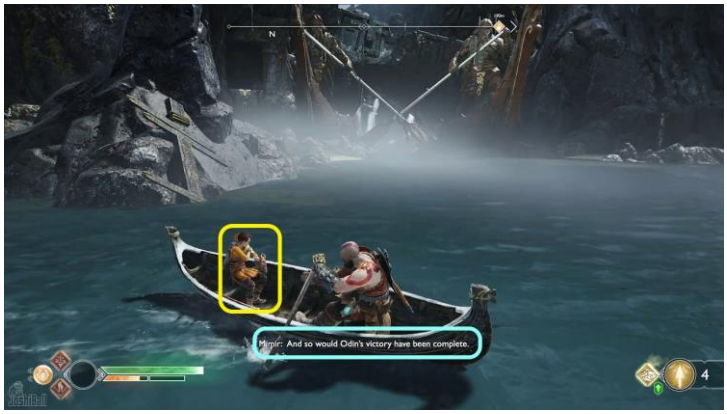
Theme 1: Tutorials

Example 1: On-demand information: The information is presented through visual prompts at the moment that it is necessary. In this case, information is given about the item, the Idunn Apple, that is found by the player (black).

Theme 2: Embedded narratives and encyclopaedic impulses

Example 1: System thinking (embedded narratives): The embedded narrative is presented through environmental aspects like these Jotün shrines (yellow). It is also documented by Atreus in his journal (black).

Example 2: On-demand information (encyclopaedic impulses): Mimir provides Kratos and the player with information about the game's world while in the boat (yellow). In this case, he explains about the Norse God Odin and his desire to reach Jotünheim (blue).



Theme 3: Kratos as a teacher

Example 1: Identification: Kratos teaches Atreus how to shoot while also potentially letting the player identify with Kratos' role as a father during this narrative scene and and scenes to follow.

Theme 4: Atreus as a guide

Example 1: System thinking (embedded narratives): Atreus guides Kratos/the player by deciphering embedded narratives (yellow). Afterwards, Atreus tells Kratos where they are and where they should go next (blue).

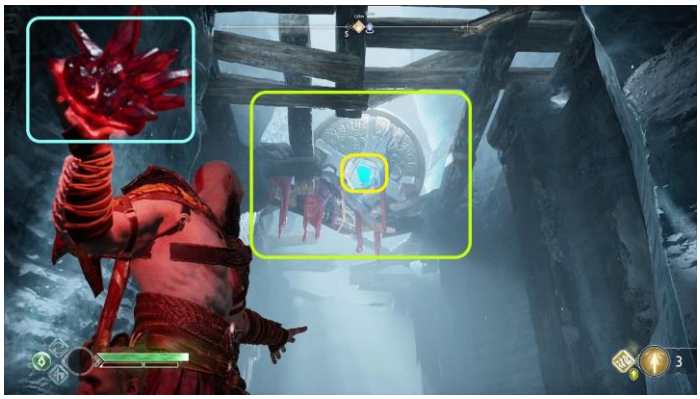
Example 2: On-demand information (perceptible affordances): Atreus or other NPC's can provide the player/Kratos with information on where to go next. More often than not the NPC's walk on ahead passing pathways that cannot be crossed yet, leading the player into the right direction (blue). In this case, Atreus passes the red wall of Yggdrasil sap (yellow) as it cannot be destroyed just yet.

Theme 5: The player as a teacher

Example 1: Customization (perceptible affordances): The player customizes the learning experience of combat by altering Kratos' gear (blue). The player has to make choices on his or her own and immediately sees the statistical and cosmetic effects of the choices (yellow).

Example 2: Co-design (perceptible affordances): The player is able to choose which skills to buy (yellow) while limited by level requirements (blue), effectively enabling the player to design their learning experience of the game's combat system. The player can also see what upgrades have already been purchased in the past (green).

Example 3: Adding expertise through repeated cycles (hidden affordances): The player is taught about key items for puzzles by repeated usage of these items, which have to be used in increasingly complex puzzles. In the image, Light crystals (yellow) and Shattering crystals (blue) have to be combined to solve the puzzle (green).



Example 4: System thinking (hidden affordances): The player's system thinking is stimulated by how solutions have to be found instinctively, using tools that are already known. In this situation, the player has to use Shattering crystals (yellow) and recognize that they explode when they touch the lightning-imbued head of the dragon (blue).

Appendix II: Sample of the data set

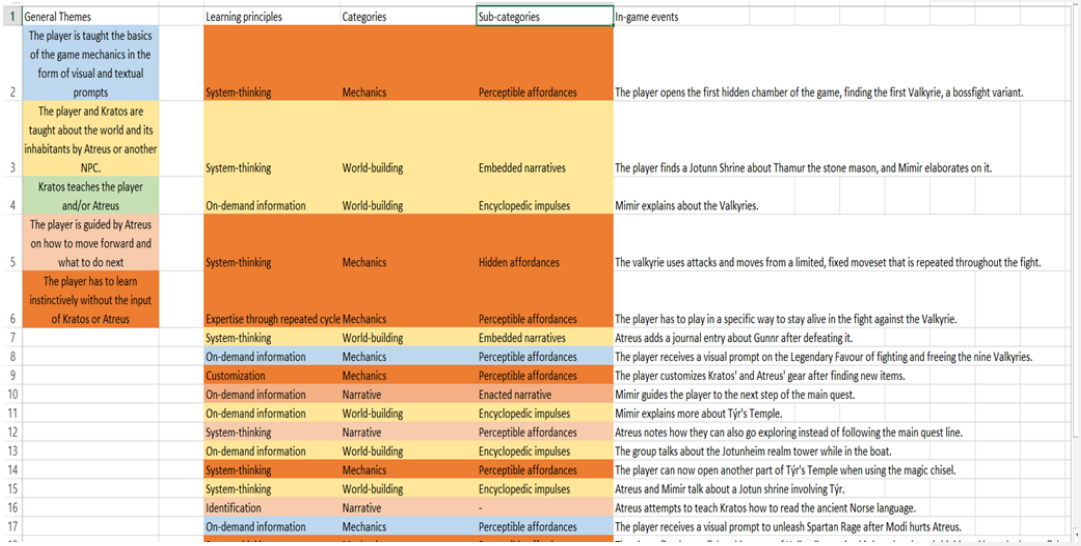
The two tables and images below function as samples for the entire data set has been built. Out of a total of 20 chapters, chapter 12 and chapter 19 have been selected to exemplify how the data has been structured during data collection. Interesting in-game events were catalogued in the order of when they were encountered, creating a timeline of interesting in-game events within each chapter. Subsequently, the importance of these in-game events was highlighted by deciding which learning principle was linked to it, what aspect of the game (choosing between mechanics, world-building and the narrative) was being impacted by it and finally, further specifying this by using sub-categories. Adding to this, the five general themes that were found during the analysis were specified in the dataset. Subsequently, colours were used to visually exemplify to which of the five general themes these in-game events and their associated learning principles, categories and sub-categories are linked.

Sample 1: Chapter 12

General themes	Learning principles	Categories	Sub-categories	In-game events
The player is taught the basics of the game mechanics in the form of visual and textual prompts	System thinking	Mechanics	Perceptible affordances	The player opens the first hidden chamber of the game, finding the first Valkyrie, a bossfight variant.
The player and Kratos are taught about the world and its inhabitants by Atreus or another NPC	System thinking	World-building	Embedded narratives	The player finds a Jotün shrine about Thamur the Stone Mason, and Mimir elaborates on it.
Kratos teaches the player and/or Atreus	On-demand information	World-building	Encyclopaedic impulses	Mimir explains about the Valkyries.
The player is guided by Atreus on how to move forward and what to do next	System thinking	Mechanics	Hidden affordances	The Valkyrie uses attacks and moves from a limited, fixed moveset that is repeated throughout the fight.
The player has to learn instinctively without the input of Kratos or Atreus	Expertise through repeated cycles	Mechanics	Perceptible affordances	The player has to play in a specific way to stay alive.
	System thinking	World-building	Embedded narratives	Atreus adds a journal entry about Gunnr after defeating her.

	On-demand information	Mechanics	Perceptible affordances	The player receives a visual prompt about the Legendary Favour of fighting and freeing the nine Valkyries.
	Customization	Mechanics	Perceptible affordances	The player customizes Kratos' and Atreus' gear after finding new items.
	On-demand information	Narrative	Enacted narrative	Mimir guides the player to the next step of the main quest.
	On-demand information	World-building	Encyclopaedic impulses	Mimir explains more about Týr's Temple.
	System thinking	Narrative	Perceptible affordances	Atreus notes how they can also go exploring instead of following the main questline.
	On-demand information	World-building	Encyclopaedic impulses	The group talks about the Jotünheim realm tower while in the boat.
	System thinking	Mechanics	Perceptible affordances	The player can now open another part of Týr's Temple when using the magic chisel.
	System thinking	World-building	Encyclopaedic impulses	Atreus and Mimir talk about a Jotün shrine involving Týr.
	Identification	Narrative	-	Atreus attempts to teach Kratos how to read the ancient Norse language.
	On-demand information	Mechanics	Perceptible affordances	The player receives a visual prompt to unleash Spartan Rage after Modi hurts Atreus.

Sample 1: Chapter 12 (as Excel sheet)



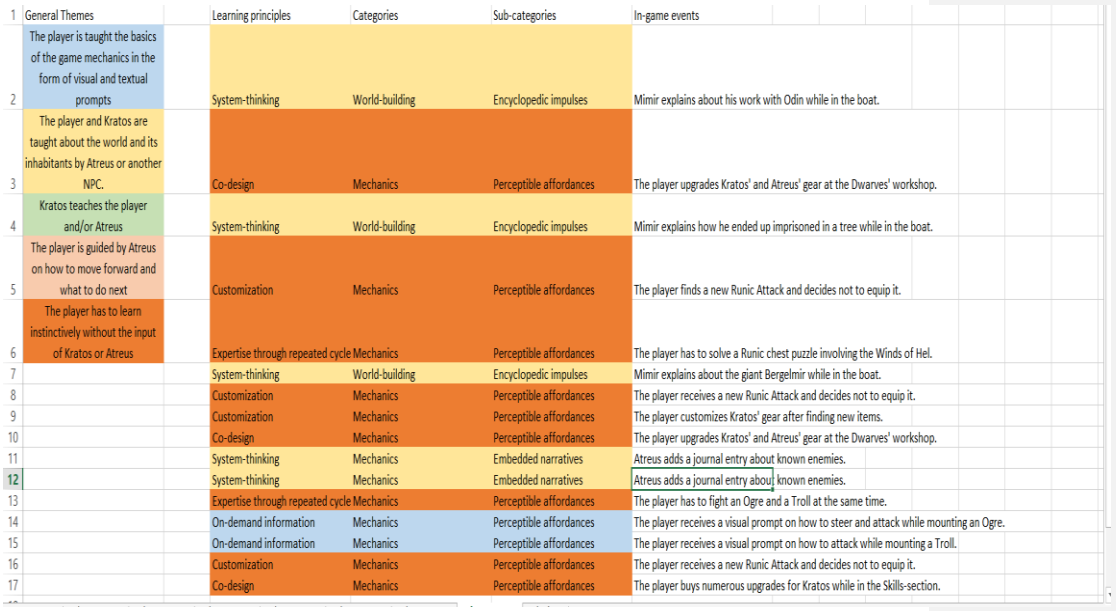
	General Themes	Learning principles	Categories	Sub-categories	In-game events
2	The player is taught the basics of the game mechanics in the form of visual and textual prompts	System-thinking	Mechanics	Perceptible affordances	The player opens the first hidden chamber of the game, finding the first Valkyrie, a bossfight variant.
3	The player and Kratos are taught about the world and its inhabitants by Atreus or another NPC.	System-thinking	World-building	Embedded narratives	The player finds a Jotunn Shrine about Thamur the stone mason, and Mimir elaborates on it.
4	Kratos teaches the player and/or Atreus	On-demand information	World-building	Encyclopedic impulses	Mimir explains about the Valkyries.
5	The player is guided by Atreus on how to move forward and what to do next	System-thinking	Mechanics	Hidden affordances	The valkyrie uses attacks and moves from a limited, fixed moveset that is repeated throughout the fight.
6	The player has to learn instinctively without the input of Kratos or Atreus	Expertise through repeated cycle	Mechanics	Perceptible affordances	The player has to play in a specific way to stay alive in the fight against the Valkyrie.
7		System-thinking	World-building	Embedded narratives	Atreus adds a journal entry about Gunnr after defeating it.
8		On-demand information	Mechanics	Perceptible affordances	The player receives a visual prompt on the Legendary Favour of fighting and freeing the nine Valkyries.
9		Customization	Mechanics	Perceptible affordances	The player customizes Kratos' and Atreus' gear after finding new items.
10		On-demand information	Narrative	Enacted narrative	Mimir guides the player to the next step of the main quest.
11		On-demand information	World-building	Encyclopedic impulses	Mimir explains more about Týr's Temple.
12		System-thinking	Narrative	Perceptible affordances	Atreus notes how they can also go exploring instead of following the main quest line.
13		On-demand information	World-building	Encyclopedic impulses	The group talks about the Jotunheim realm tower while in the boat.
14		System-thinking	Mechanics	Perceptible affordances	The player can now open another part of Týr's Temple when using the magic chisel.
15		System-thinking	World-building	Encyclopedic impulses	Atreus and Mimir talk about a Jotun shrine involving Týr.
16		Identification	Narrative	-	Atreus attempts to teach Kratos how to read the ancient Norse language.
17		On-demand information	Mechanics	Perceptible affordances	The player receives a visual prompt to unleash Spartan Rage after Modi hurts Atreus.

Sample 2: Chapter 19

General themes	Learning principles	Categories	Sub-categories	In-game events
The player is taught the basics of the game mechanics in the form of visual and textual prompts	System thinking	World-building	Encyclopaedic impulses	Mimir explains about his work with Odin while in the boat.
The player and Kratos are taught about the world and its inhabitants by Atreus or another NPC	Co-design	Mechanics	Perceptible affordances	The player upgrades Kratos' and Atreus' gear at the Dwarves' workshop.
Kratos teaches the player and/or Atreus	System thinking	World-building	Encyclopaedic impulses	Mimir explains how he ended up imprisoned in a tree while in the boat.
The player is guided by Atreus on how to move forward and what to do next	Customization	Mechanics	Perceptible affordances	The player finds a new Runic Attack but decides not to equip it.
The player has to learn instinctively without the input of Kratos or Atreus	Expertise through repeated cycles	Mechanics	Perceptible affordances	The player has to solve a Runic chest puzzle involving the Winds of Hel.
	System thinking	World-building	Encyclopaedic impulses	Mimir explains about the giant Bergelmir while in the boat.
	Customization	Mechanics	Perceptible affordances	The player receives a new Runic Attack but decides not to equip it.
	Customization	Mechanics	Perceptible affordances	The player customizes Kratos' gear after finding new items.
	Co-design	Mechanics	Perceptible affordances	The player upgrades Kratos' and Atreus' gear at the Dwarves' workshop.
	System thinking	Mechanics	Embedded narratives	Atreus adds a journal entry about known

				enemies.
	System thinking	Mechanics	Embedded narratives	Atreus adds a journal entry about known enemies.
	Expertise through repeated cycles	Mechanics	Perceptible affordances	The player has to fight a Troll and an Ogre at the same time.
	On-demand information	Mechanics	Perceptible affordances	The player receives a visual prompt on how to steer and attack while mounting an Ogre.
	On-demand information	Mechanics	Perceptible affordances	The player receives a visual prompt on how to attack while mounting a Troll.
	Customization	Mechanics	Perceptible affordances	The player receives a new Runic Attack but decides not to equip it.
	Co-design	Mechanics	Perceptible affordances	The player buys numerous upgrades for Kratos while in the Skills-section.

Sample 2: Chapter 19 (as Excel sheet)



	General Themes	Learning principles	Categories	Sub-categories	In-game events
2	The player is taught the basics of the game mechanics in the form of visual and textual prompts	System-thinking	World-building	Encyclopedic impulses	Mimir explains about his work with Odin while in the boat.
3	The player and Kratos are taught about the world and its inhabitants by Atreus or another NPC.	Co-design	Mechanics	Perceptible affordances	The player upgrades Kratos' and Atreus' gear at the Dwarves' workshop.
4	Kratos teaches the player and/or Atreus	System-thinking	World-building	Encyclopedic impulses	Mimir explains how he ended up imprisoned in a tree while in the boat.
5	The player is guided by Atreus on how to move forward and what to do next	Customization	Mechanics	Perceptible affordances	The player finds a new Runic Attack and decides not to equip it.
6	The player has to learn instinctively without the input of Kratos or Atreus	Expertise through repeated cycle	Mechanics	Perceptible affordances	The player has to solve a Runic chest puzzle involving the Winds of Hel.
7		System-thinking	World-building	Encyclopedic impulses	Mimir explains about the giant Bergelmir while in the boat.
8		Customization	Mechanics	Perceptible affordances	The player receives a new Runic Attack and decides not to equip it.
9		Customization	Mechanics	Perceptible affordances	The player customizes Kratos' gear after finding new items.
10		Co-design	Mechanics	Perceptible affordances	The player upgrades Kratos' and Atreus' gear at the Dwarves' workshop.
11		System-thinking	Mechanics	Embedded narratives	Atreus adds a journal entry about known enemies.
12		System-thinking	Mechanics	Embedded narratives	Atreus adds a journal entry about known enemies.
13		Expertise through repeated cycle	Mechanics	Perceptible affordances	The player has to fight an Ogre and a Troll at the same time.
14		On-demand information	Mechanics	Perceptible affordances	The player receives a visual prompt on how to steer and attack while mounting an Ogre.
15		On-demand information	Mechanics	Perceptible affordances	The player receives a visual prompt on how to attack while mounting a Troll.
16		Customization	Mechanics	Perceptible affordances	The player receives a new Runic Attack and decides not to equip it.
17		Co-design	Mechanics	Perceptible affordances	The player buys numerous upgrades for Kratos while in the Skills-section.