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"What's in a Game?
Gamification and its Potential for Education"

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Introduction

With the advent of smartphones and tablets, more and more tasks are performed with the help of electronic devices. There is an app for virtually anything. *Shazam* identifies music, *Google Lens* translates foreign languages by means of a simple scan, and *Stay Focused* restricts the use of other apps should they prove too time consuming. Additionally, there is a plethora of digital games that can be downloaded and played in an instant with any smart device that is connected to the internet.

Smart devices and mobile games bring along a phenomenon called “gamification”. Gamification will be defined closely in a later chapter, but it can be described as using techniques and mechanics from games in non-game contexts to make them more engaging. It is important to note that it does not mean introducing video games in non-games contexts, but rather to make non-game contexts feel more like a game. It is used in apps to motivate users to use the apps even more. *Duolingo,* for example, uses gamification strategies to motivate their user for learning a foreign language. Learning is therefore perceived as a game.

Seeing as 96% of young Austrians between 15 and 30 own a smartphone (Schultz 2019), it makes sense to apply gamification to the educational system. Internationally, there have been several attempts at introducing gamification to school, with due success (Çakıroğlu et al. 2017; Khan et al. 2017; Borsos 2019)

I personally have experienced the motivational force of games first-hand. I have fond memories of receiving my first Game Boy at age ten. These memories entail me sitting in school, fidgeting nervously in my seat until I could go home to play games. I already understood that video games knew how to motivate me, much unlike school, which I saw as a nuisance. It was only until much later that I asked the question **why** video games motivated me so much more than school. After playing *The Legend of Zelda: Breath of the Wild* (Nintendo 2017), I finally understood that this well-designed video game tricked me into learning skills that I needed to beat the game. Ultimately, I had been motivated by my desire to learn, all along.

This thesis strives to explore how techniques and mechanics that are used in video games can be applied to education. I have formulated the following research questions: “Which learning strategies found in video games can be used in education?” and “Which gamification strategies are most popular among a demographic of 14-to-16-year-olds?”.

The first chapter of this thesis shall provide theoretical background on gamification, motivational psychology, flow, and the darker aspects of gaming, namely addiction and violence. The second chapter is an analysis of the abovementioned game, *Breath of the Wild,* with special focus on how the game teaches the player. The third chapter deals with a gamified learning experience, namely the abovementioned *Duolingo.* Part four is an empirical study in which teenagers between 14 and 16 years of age were asked for their opinion on several gamification strategies, in order to determine which are good contestants to implement in school.

1. Theoretical background

1.1 Gamification – a definition

Even though the term 'gamification' was conceived in 2008, (Deterding et al. 2011: 9), it lacked a proper definition until Deterding et al. suggested one in 2011, which goes as follows: "Gamification is the use of game design elements in non-game contexts" (ibid.). Special emphasis lies on 'non-game context'. The idea is to make tasks more like games in order to make them more engaging. The definition seems unconcise, however, because one could argue that games, too, can be gamified. An example can be found in *The Witcher III: Wild Hunt* (CD Project RED 2015). It is an Open World Role Playing Game featuring a fully playable trading card game, which the player can play within the video game. Playing against various NPCs[1], the player can play for in-game money and rare cards. Thus, there is an additional incentive to roam the world, looking for strong players to best and cards to find. This card game could be considered an example of gamification within a game. However, Deterding et al. would likely disagree. They would argue that the card game mechanic cannot be considered gamification, because it is employed in a video game. It may only be considered gamification if it was used in a non-game context, such as education. For Deterding et al., gamification clearly describes a shift from non-game towards game.

A more up-to-date definition is provided by Houtari and Hamari, who define gamification as follows: "Gamification refers to a process of enhancing a service with affordances for gameful experiences in order to support users' overall value creation" (Houtari & Hamari 2017: 25). This definition is rather verbose and needs unpacking. Some words' contextual meaning is unclear, namely 'service', 'gameful' and 'value creation'.

A 'service' is "the application of specialized competences […] through deeds, processes, and performances for the benefit of another entity or the entity itself" (Vargo & Lusch 2004: 2). In simpler words: a service is anything that is done to help anyone or contribute to anything. Hence, 'service' can also describe

[1]NPC is short for 'non-player-character. It means any character that is not controlled by a human player.

something that an individual does for themselves. Whether the individual performs the service for someone else's sake or their own is irrelevant as long as the service has value – a student studying for an exam is still performing a service, just like a gamer playing a game for leisure.

'Gamefulness' can be traced back to McGonigal, who sees it as a character trait. She says gamefulness is a gamer's willingness to voluntarily put hard work on themselves to beat the game (McGongial 2011: 27). A gamer wants to overcome a game's challenges urgently enough to put hours and hours of work into besting said challenges with no other reward than having beaten the game. According to McGonigal, the reason why people act gameful is that games provoke positive emotions. They make us feel productive through "an optimistic sense of our own capabilities and an invigorating rush of activity" (op cit.: 28). Productivity and happiness are closely tied and have been shown to be interrelated (Cropanzano & Wright 2001: 183). McGonigal's concept of Gamefulness is complex and multifaceted, but for our purposes, it can be summarized in a sentence: 'Gamefulness' means generating good emotions by willingly overcoming obstacles.

'Value creation' is rather abstract. According to Houtari and Hamari, a game can have many values, among them "pleasure, suspense, mastery" Houtari & Hamari 2017: 25). Gamefulness itself can be a value, as well (ibid.) Values are highly variable because different players demand different things from their games. A game's value is whatever the player finds valuable. Consequently, the player is actively involved in the value creation of a game, because the player's experience is the created value. Ultimately, what creates value is the player's involvement in the game and their expectations for the game.

Having unpacked and rephrased Houtari and Hamari's definition of gamification, it can be worded in a simpler way: Gamification means increasing a task's value (such as enjoyment or productivity) by introducing challenges that result in feelings of accomplishment. Note that, in contrast to Deterding et al.'s definition of gamification, Houtari and Hamari concede that games can be gamified, as well, depending on the value for the individual player. Houtari and Hamari openly reject Deterding et al.'s definition: "We diverge sharply from the definition of gamification

proposed by Deterding et al. (2011), which stresses that only non-games can be gamified" (Houtari & Hamari 2017: 25). There is no problem introducing additional gameful mechanics to games in order to make the game more enjoyable. Because a task's value is so individually defined, any task can be gamified, and any mechanic that makes the player feel accomplished can be considered gamification. Also, *The Witcher 3: Wild Hunt's* card game mechanic holds up to Houtari and Hamari's definition and can indeed be considered an example of gamification within a game. The card game increases the video game's playworthiness by providing a challenge in which the player can invest time to get better and feel productive.

Houtari and Hamari's definition of gamification differs from Deterding et al.'s in so far as it is more open-minded. Houtari and Hamari understand that gamification is not only applicable to non-games, but to any activity whose value can be enhanced by introducing challenges. Since the meaning of gamification is highly dependent on the individual, an open mind is crucial for the endeavor of defining it.

It has been shown that gamification is the process of incorporating playful tasks and challenges into different contexts to make them more engaging. These playful tasks and challenges are commonly adapted from games, especially video games. The following sections examine why video games have an engaging effect on players, in order to clarify why gamification adapts elements from video games, specifically.

1.2 Motivation

People spend lots of time playing video games. According to Limelight Network (2018), the average gamer spends just short of 6 hours a week playing video games. Indeed, gamers worldwide spend a combined 225 million hours a week playing *World of Warcraft* (Przybylski et al. 2010: 154). Apparently, video games understand to captivate and motivate their players. To achieve such captivation and motivation, game designers must employ certain knowledge, knowledge that educators would do well to understand. This section, section 1.2, depicts two theories on motivation. First, Self-Determination Theory shall be explained, which also includes techniques to make individuals motivate themselves. Then, the ARCS-model shall be explained, which focuses on techniques that can be utilized

by teachers in the classroom. These theories shed light on how motivation works and why people are motivated in the first place.

1.2.1 Self-determination theory

Self-determination theory was proposed by Deci and Ryan (2000) and has been object of discussion for many years. It seeks to understand why people engage in certain behavior and what motivates them to do so. The theory is applicable to many a topic, such as sleeping (Campbell et al. 2015), employee satisfaction (Lohmann et al. 2016), and even breastfeeding (Kestler-Peleg et al. 2015). Self-Determination Theory has copiously been examined in the context of video games (Ryan et al. 2006; Przybylski et al. 2012; Lafrenière et al. 2012) and can also be applied to education (Deci et al. 2001).

Education and video games initially seem like incongruent topics, but there is one crucial point that connects the two: Both school and video games are designed to teach an individual skills. Granted, while school is intent on teaching students useful real-life skills, games are concerned with teaching the player skills that are useful in the game. Still, the element of teaching and learning is present in both education and video games. Self-Determination Theory sheds light on why learning in games is motivating, whereas learning in school is mostly seen as tedious.

Self-Determination Theory argues that people strive to carry out activities that they choose to do themselves, e.g. that they are intrinsically motivated to do (Deci & Ryan 2000: 229). Intrinsic motivation can be illustrated by playing video games, since many pursue the activity for the sole purpose of pursuing it. There are no rewards[2] and no other reasons to play the game safe for playing the game.

According to SDT, intrinsic motivation consists of three psychological needs, which can be satisfied to produce psychological well-being. These three psychological needs are Autonomy, Competence, and Relatedness (ibid.). The following segment shall explain what the three psychological needs entail.

[2]Rewards would result in *extrinsic motivation*, which may even undermine intrinsic motivation, meaning that an individual who was intrinsically motivated to do a task would stop enjoying said task when they are offered a reward for doing it (Deci et al. 2001: 3).

1.2.1.1 Autonomy

Autonomy describes an individual's need to be in control. When playing a video game, the player must feel like they are playing by choice and that they are free to do as they please. Autonomy is closely tied to the perceived locus of causality (PLOC), which describes the individual's felt origin of incentive to act (Ryan & Connell 1989: 759). The PLOC is where the individual feels that the reason to do something is situated: either within themselves or outside. In truth, the PLOC must be considered a spectrum, since there are aspects that inhibit an individual's Autonomy while stemming from the individual themselves, such as anxiety (ibid.). The spectrum's ends are, however, within the individual or outside the individual. If an individual engages in an activity because they are interested in said activity, the PLOC is within themselves. If they are offered something, threatened or put under pressure to perform the activity, the PLOC shifts from within the individual to outside of the individual. Intrinsic motivation becomes extrinsic motivation.

Extrinsic motivation means that an individual engages in an activity not because they inherently enjoy the activity, but because they have external reasons to act (Schmuck et al. 2000: 226). Motivating an individual extrinsically, for instance by offering rewards, is a common way for teachers to motivate their students. I personally remember several instances of external motivation from my own school days: my elementary school teacher would offer a gummy bear to anyone who spots a mistake he made, offering extrinsic rewards for students' attention. A classmate would receive a new TV for his bedroom if he passed a test with a good grade. Such external rewards will, in most cases, diminish the individual's intrinsic motivation; offering a reward for a task will result in "less creativity […] and poorer problem solving" (Deci & Ryan 2000: 234). While it is true that adding external rewards mostly shifts intrinsic motivation to extrinsic motivation, there are exceptions. Some external rewards like positive feedback can, in fact, increase intrinsic motivation, but only if the reward is not expected (Deci et al. 2001: 15). As soon as an individual expects to be rewarded for a task, they will perform the task for the reward, whether knowingly or not.

In school, it can be difficult to elicit student's Autonomy because students do not attend school by choice. Students' innate intrinsic motivation is compromised because outside forces such as teachers, parents, or the law pressure students to

attend. As a result, students' Autonomy is low from the beginning. Even in Montessori-type schools, where students experience immense freedom of choice (cf. Montessori Europe 2017), their Autonomy is diminished because they are forced to attend school, just the same. A hypothetical idea to maximize student Autonomy would be letting them choose and switch schools more flexibly than in the current system, but systemic change cannot be expected soon. Instead, student Autonomy can be increased by giving students more opportunity for participation at the beginning of a school term, which will increase their engagement and involvement throughout the year, as their perceived Autonomy will be much higher than in cases where students feel patronized from the start (Hafen et al. 2011: 252). As long as the students feel like they have some sort of control over their learning and their school life, engagement will be increased.

1.2.1.2 Competence

Competence describes an individual's need to feel capable. An individual must feel like their capabilities increase while they play a game, meaning that they must feel like they are making progress. Of course, to see whether they are making progress, an individual needs constant feedback. Feedback can have an immense impact on the player's feeling of Competence (Deci & Ryan 2000: 234). Positive feedback enhances or maintains an individual's intrinsic motivation, and negative feedback diminishes the individual's intrinsic motivation. If an individual has the impression to be good at an activity, they will pursue that activity more readily.

In the context of video games, positive feedback may take the form of a powerful enemy that is finally defeated or a difficult level that is finally bested. In a video game, the player can attempt to overcome an obstacle again and again, testing new approaches every time. When the player succeeds, they feel triumphant, which is the positive feedback needed to maintain motivation. The player then feels an emotion called 'fiero', which was coined by Lazzaro. She defines fiero, which is the Italian word for 'triumph', as "personal triumph over adversity" (Lazzaro 2004: 6).

Arguably, school is very well-suited to elevate individuals' feeling of Competence by providing positive feedback. Teachers can praise students on their progress, strengthening their feeling of Competence. Unfortunately, inciting fiero among the

students is difficult because of how the educational system is structured. In the current system, students cannot develop new strategies based on previous mistakes. Once a student gets a bad grade on an exam, that grade stays with them for the rest of the year. While they may improve their grade per the next exam, that exam will be an entirely new obstacle and not nullify the initial bad grade. A mistake once made cannot be erased. Could the students attempt challenges repeatedly, each time incorporating new insights, their intrinsic motivation may be much higher than in the current system.

Conversely, one study has found that grades and intrinsic motivation are only weakly related and that bad grades do not equal decreased intrinsic motivation. (Weidinger et al. 2017: 200). As a consequence, letting students reattempt exams to improve their grade may have no effect on their motivation, either. Nevertheless, providing the students with opportunities to experience fiero should still elevate their motivation, even if grades do not. Additionally, what does have an effect on students' motivation is verbal feedback. Both positive and negative feedback result in students intending to put more effort into their studies, positive feedback slightly more so. The bigger difference can be found in regard to student-teacher relationships: Positive feedback has shown to improve student-teacher relationship, while negative feedback impairs it (Kannappan et al. 2012: 800). Rather than grades, students' Competence should therefore be increased by providing constructive, meaningful feedback. For the sake of a supportive learning environment, said feedback should ideally be positive.

1.2.1.3 Relatedness

Relatedness describes an individual's need to feel part of a social group. Individuals are more inclined to improve in an activity if they can compete against or cooperate with others (Deci & Ryan 2000: 235). Admittedly, it can be argued that many people are invested in hobbies that forbid competition or cooperation, such as knitting, learning musical instruments, or playing single player games. Deci & Ryan (ibid.) argue that, indeed, many hobbies are pursued in solitude, yet it is beneficial if there is a particular social environment as a backdrop in order to get an individual motivated in the first place. Even if a hobby is not fit for groups, it is more motivating if the individual is able to exchange with other enthusiasts, talking

about a newly knitted scarf, a recently learned musical piece, or a completed video game.

School is a perfect setting for social activities. Students are constantly surrounded by peers of the same age, and they are constantly engaged in the same tasks, making it easy for students to compete with, or assist each other. The way schools are designed, however, makes it difficult for students to compete or cooperate on their own terms. It could be argued that students' motivation would be much higher if they were offered the chance to go their own way in school, choosing when to compete, when to cooperate and when to work on their own. In other words: Relatedness is inherently given in school, but Autonomy is the aspect that is missing.

1.2.1.4 Applying SDT to school

In this section, a hypothetical school type that incorporates elements from Self-Determination Theory, to maximize student engagement, shall be discussed.

The hypothetical school is located in a building in which the students are free to roam as they please. Every classroom is dedicated to a school subject and the students decide which topics they want to learn about. Teachers give talks at fixed times, and students may engage with texts or items at their own discretion, asking teachers and fellow students for help. The students have as much freedom of choice as possible, which reflects the concept of Autonomy (Deci & Ryan 2000: 234), and by helping and working with one another, they get a feeling of Relatedness, a social backdrop that further motivates them (op. cit.: 235). When the students feel ready, they may subject themselves to an exam, which can be taken multiple times. If they fail, they can prepare for the next attempt more efficiently and reattempt it as many times as they need to pass the exam. In addition to exams, students also need to write papers, which they can hand in as soon as they think they meet the requirements. A teacher then provides feedback on the student's papers, which the student can use to improve until they receive a passing grade. When the student overcomes the challenge of passing an exam or writing a satisfactory paper, they are likely to experience fiero (Lazzaro 2004: 6), which acts as positive feedback and therefore elicits a feeling of Competence in the students (Deci & Ryan 2000: 235). One could consider setting the bar very

high, so that students are required to work until they produce their best possible results, although this could be handled by every school individually.

Admittedly, the proposed system bears many similarities to the Montessori school type, especially the part about students engaging with materials at their own discretion, and the part about subject-specific classrooms. However, the proposed system also brings new ideas to the table, specifically because its foremost aim is to satisfy the students' three psychological needs. Students have a feeling of Autonomy because they decide which content they want to study. They have a feeling of Competence because they can see their progress based on their exam record. They have a feeling of Relatedness because they are required to learn with and from each other in order to pass exams. I venture to say that the students' intrinsic motivation would increase immensely if they have control over their own education. The hypothetical school type is a school type reflecting Self-Determination Theory.

1.2.2 Making your own motivation

In the previous few paragraphs, I have repeatedly described one of school's current problems: It inherently forces students to attend, which means they are present because of external instead of internal reasons. In addition, students are given mainly external incentives, good grades, which may not be the best way to motivate students. In fact, individuals who work under intrinsic motivation deliver better results than extrinsically motivated individuals (Kuvaas et al. 2017: 251) and may even experience higher levels of psychological well-being (Przybylski 2010: 154). Unfortunately, extrinsic motivation cannot simply be turned into intrinsic motivation, but extrinsic motivation can at least be turned into something that resembles intrinsic motivation. The process of shifting external motivation more towards internal motivation is called internalization, and with it, "individuals assimilate and reconstitute formerly external regulations so the individuals can be self-determined while enacting them" (Deci & Ryan 2000: 235). The process of internalization shall be outlined below. It must be noted that the process is a shift from extrinsic motivation *towards* intrinsic motivation. None of the steps, not even the last, describe intrinsic motivation in its true form (Deci & Ryan 2000: 236).

1.2.2.1 External Regulation

External regulation is the most extrinsic in nature. It is what has hence, in this thesis, been referred to as extrinsic motivation. It means that an individual performs a task because of outside forces unrelated to the task proper, such as rewards or threats and the individual has no internal reason to pursue a behavior. For example, if a student studies for an exam solely because their parents will deny them their television if they fail, that would be external regulation. As repeatedly mentioned, external regulation has a devastating effect on an individual's intrinsic motivation – even if they would have enjoyed the task initially, they will now resent doing it (Deci & Ryan 2000: 236). School is a typical example of external regulation, because it makes students do work by awarding good or bad grades. The value of an exercise for a student's learning is only of secondary importance.

1.2.2.2 Introjection

Introjection is the first step toward intrinsic motivation. It describes individuals who have made it their goal to complete a task for the sake of completing it, but do not see the value the task may have. They may complete the task to bolster their ego or get validation from their peers, but in any case, the perceived locus of causality (PLOC) is now within the individual (ibid.). Still, although the individual motivates themselves to do the task, they do not enjoy it. Introjection only means that the motivation to do something now comes from within the subject.

1.2.2.3 Identification

An individual who has identified with a task sees the value of it and brings themselves to complete it because they understand that it will benefit them. However, they still do not find joy in performing the task. Identification can be illustrated by an individual who exercises regularly because they understand that it will positively impact their health and their overall well-being (Deci & Ryan 2000: 236). The individual does not necessarily enjoy the activity but pursues it for its value.

1.2.2.4 Integration

Integration is the purest form of self-determinant motivation. An individual who has integrated a behavior "not only [identifies] with the importance of behaviors but also [integrates] those identifications with other aspects of the self" (ibid.). It means that,

after integration, the individual will have identified with a behavior and even adopted the behavior to a point where it reflects their self-image (Knee et al. 2013: 307). The behavior is made part of the individual's personality. It is the most intrinsic level reachable for externally imposed activities.

1.2.2.5 Making your own motivation - conclusion

Rewards and punishments alone are not a good incentive for individuals to change their behavior (Bowles & Polanía-Reyes 2012: 419). An individual can only motivate themselves to change their behavior through understanding the benefits of the new behavior and, ideally, integrate them into their own self-image.

A good video game knows to internally incentivize the player by providing goals that are ideally relevant to a player. Each game mechanic the player learns is useful towards that greater goal. Furthermore, a well-designed game knows to introduce a new mechanic only when the player's needs for it arise, not earlier. The player then immediately knows when and how to use the mechanic and what its value for beating the game is.

In school, students' general incentive to complete tasks are grades, yet their performance would improve if they understood how each task contributes to a larger overall goal, ideally one that is personally relevant to the student. Teachers could find ways to internally incentivize their students. For instance, students could be asked to formulate a goal at the beginning of the school year, which will then provide incentives to improve their skills. A student may perhaps formulate the goal that, at the end of the school year, they want to hold a fluent conversation in English with their foreign neighbor. With a goal like this in place, every English lesson will give them tools to achieve their goal, a goal which the student set themselves.

Unfortunately, even if students formulate their own goals and manage to integrate the tasks they are set, their motivation ultimately stays extrinsic. While students' motivation may resemble something like intrinsic motivation, it will never truly become intrinsic, because the motivation is still instrumental (Deci & Ryan 2000: 237). The students are still trying to achieve a goal that was ultimately imposed by a teacher. Still, getting students to integrate learning can have positive effects for both the student and the teacher.

1.2.3 Attention, Relevance, Confidence, and Satisfaction (ARCS)

Naturally, it is not only the students' responsibility to stay motivated, but teachers can have influence on student motivation, as well. The ARCS model, designed by Keller (1987), outlines four factors that must be given in order to keep individuals engaged in an activity. These four factors are Attention, Relevance, Confidence and Satisfaction. They shall be outlined in the following. Admittedly, the concept is rather old, yet it still contains knowledge about motivation that is valuable to educators. In addition, there are some aspects to this model that are relevant in chapters 2 and 3, which are analyses of games and gamified learning applications for their motivational potential.

1.2.3.1 Attention

Attention is crucial for motivation, since students are impossible to motivate if they do not know what is happening in the first place. There are various techniques for catching the students' attention, such as "a dramatic statement, a sharp noise, [or] a quiet pause" (Keller 1987: 3). Catching students' attention is, however, only one part. The other part is sustaining students' attention over an extended amount of time, since only then can motivation arise (ibid.). There are several strategies provided to sustain students' attention, many of which are strategies that are commonly encountered in video games. For example, Keller recommends regular problem-solving activities in class (Keller 1987: 4) to cognitively stimulate the students. Many video games, too, regularly implement puzzles that can be solved through logical thinking, such as the *Legend of Zelda*-Series, or the *Tomb Raider*-games. Furthermore, Keller suggests giving students a choice on what they want to learn in-depth, which conforms with the idea of Autonomy mentioned in section 1.2.1.1. A teacher should also keep in mind to present the students no more information than whatever amount they can stomach. Too little input and the students feel bored. Too much input and the students feel overwhelmed (Keller 1987: 3). Of course, the content should aim to entertain the students' curiosity and sensationalism. Keller says that a teacher can sustain their class' attention by finding a "balance between boredom and indifference versus hyperactivity and anxiety" (ibid.).

1.2.3.2. Relevance

Students are motivated to learn something when they can see how their learning benefits them outside of school. Teachers may try to frame their teaching as relevant by telling the students about job prospects. However, job prospects may not be enough to make school seem relevant because they are an external incentive and will not help achieving intrinsic motivation.

Instead, teachers should motivate students for the process of learning itself. Students perceive learning as relevant if the employed teaching style adheres to the students' learning needs (Keller 1987: 3). Differently put, a student that requires high amounts of interactivity should work in groups often. A student that needs to feel accomplished must be regularly presented with tasks that are slightly underneath their Competence level. If the students' learning needs are satisfied, they will perceive their learning as relevant.

1.2.3.3 Confidence

Students are more likely to stay engaged when they are confident that they can overcome the challenges posed by the teacher. While confident students locate the reason for their success within themselves, unconfident ones attribute their success to external factors such as luck or assistance from others. Since unconfident students do not manage to rely on their own abilities to succeed, they live in constant fear of failing, which is highly frustrating. Teachers often do not realize how big of a problem fear of failure is (Keller 1987: 5), which makes it especially important to pay attention to the students' Confidence.

Approaches to increase the students' Confidence are manifold and can oftentimes be found in video games, as well. Teachers can, for example, formulate clear learning goals to come with material (ibid.), a strategy employed by virtually any video game, as the player could not be expected to play the game without clear directions. Materials should be designed to grow increasingly more challenging (ibid.), which makes the workload seem like a climbable mountain rather than an unscalable cliff, a design choice that also resembles the setup of many video games. Consider the *Pokémon*-games (Game Freak 1996), where players' opponents grow slowly stronger the further the player progresses. Most importantly, teachers should communicate to their students that striving for

greatness does not mean that everything other than perfection is bad, but rather (as already mentioned in section 1.2.1.2), that mistakes are an opportunity to grow and that growing should be regarded as an accomplishment.

1.2.3.4 Satisfaction

The concept of Satisfaction in the ARCS model explains the (in chapter 1.2.1.1) mentioned fact that external rewards usually undermine intrinsic motivation. Keller says that students are no longer intrinsically motivated to perform a task when they are bribed or threatened because that is when the students lose control over their own behavior (Keller 1987: 6). A student will only feel truly satisfied when they are working on their own accord. There are, however, appropriate times to use external incentives to foster intrinsic motivation, given the teacher knows to find a balance between incentivizing students and leaving them in control. Some of Keller's strategies for satisfaction are the following: Students should use their newly found ability immediately after learning it, which is a technique oftentimes employed by video game tutorials (see section 2.2). Furthermore, teachers should provide positive feedback immediately after task fulfillment, as encountered in *Tomb Raider* (Square Enix 2013), where solving puzzles allows the player to progress through the world. Additionally, teachers should employ positive attention in class rather than surveillance and praise students regularly while they learn (Keller 1987: 5).

1.2.3.5 ARCS - conclusion

Keller's ARCS model employs several techniques to ensure students' motivation. For example, Keller's ideas to sustain students' Attention seem useful to apply in class, and his views on Relevance and Confidence reflect the popular notion of differentiated learning, according to which student learning is most effective if the students are provided with several tasks requiring different skill levels (cf. Wunsch 2009: 41). Admittedly, the ARCS model was developed over 30 years ago and therefore seems obsolete in some ways. Under Satisfaction, Keller calls to unexpectedly reward intrinsically motivated students with external rewards. Presumably, his reasoning is that unexpected praise helps boosting morale while not diminishing intrinsic motivation since the student is not promised a reward *before* completing a task. However, randomly rewarding students for completing intrinsically motivating tasks seems counterproductive. As soon as the first student gets a reward, all other students will perceive the possible reward as an incentive,

which diminishes intrinsic motivation. Furthermore, rewarding students at random will be frustrating for other students who did not get a reward, which will foster rumors about favoritism on the teacher's part. Granted, the frustration can be countered by rewarding all students at the same time, but that would completely remove the element of randomness and therefore refute the point of random rewards in the first place.

Keller's ARCS-model is meaningful in its core, providing sensible ideas to motivate students. While it is true that it is three decades old and some ideas are outdated, many parts of the model are relevant to the idea of gamification. The model will be readdressed in the chapters 2 and 3 of this thesis.

1.3 Flow

Video games beckon with their ability to fully immerse the player. Any gamer has memories of sessions where they were completely in 'the zone', spending hours on hours in a video game, only to at some point realize how much time has passed and that they should probably go to sleep. Some people experience the zone while working. Kennedy et al. describe the zone as "an elevated yet effortless sense of concentration" (Kennedy et al. 2014: 48).

The zone is closely tied to Csikszentmihalyi's concept of 'flow'. Flow can be recognized by the following phenomena (Nakamura & Csikszentmihalyi 2002: 90):

- Intense and focused concentration on what one is doing in the present moment
- Merging of action and awareness
- Loss of reflective self-consciousness (i.e., loss of awareness of oneself as a social actor)
- A sense that one can control one's action; that is, a sense that one can in principle deal with the situation because one knows how to respond to whatever happens next
- Distortion of temporal experience (typically, a sense that time has passed faster than normal)
- Experience of the activity as intrinsically rewarding, such that often the end goal is just an excuse for the process

In one sentence, flow means being so engrossed in an activity that all focus lies on the task at hand and the outside world ceases to exist. Ironically, as soon as an individual asks themselves “Is this flow?”, the flow is interrupted, and the individual is working self-consciously again (Csikszentmihalyi 1992: 61). Periods of true flow are rare and short-lived, but productive working does not mean sustaining true flow; it means entering the state of flow again and again.

Flow can only occur when certain factors are given: The individual must be presented with a task that challenges their abilities without overstepping their boundaries, and the individual must be provided with clear goals and immediate feedback (Nakamura & Csikszentmihalyi 2002: 90). Therefore, school seems like the ideal place to put students into a state of flow. Ideally, students are already provided with tasks that challenge, but stay within, their current abilities. Teachers structure their lessons with clear goals and provide immediate feedback. Another area with where flow frequently occurs is games (Csikszentmihalyi 1992: 62).

The effects of flow can be illustrated by the case of David Sudnow, a Jazz pianist who experienced flow in a video game firsthand. In the 1980s, he decided to pick up a video game called *Breakout*. After starting the game, Sudnow was completely immersed in a matter of seconds. He ended up playing the game for several hours a day, for three continuous months. He found the experience so alien that he decided to bring it all to paper, the result of which is “Pilgrim to the Microworld” (Sudnow 1983). In this book, Sudnow discusses his experience with the video game.

Breakout is a simple game, as all games were in 1983; the screen would show lines of colorful bricks at the top and a rectangular paddle on the bottom, which could be moved by the player, either to the left or to the right. At the player’s discretion, a ball would start bouncing between bricks and paddle and destroy any brick it would hit. The player’s objective is to destroy all bricks with no more than five balls, while the game becomes more and more challenging the longer it is played.

Sudnow, motivated by curiosity, found himself doing a task that was easy enough for anyone to do, and was presented with the clear goal of clearing the bricks. Immediately, he saw the most sensible first goal: breaching the brick wall so that

the ball would bounce around in the space between the brick wall and the top screen border, destroying a large number of bricks before dashing back to the paddle (Sudnow 1983: 26). This immediate first goal seemed just outside of his current abilities, but with a little work, he knew he could do it, which resulted in flow. The first time he played the game, he took turns with his neighbor, who breached the brick wall without much effort while Sudnow struggled. The felling of

Fig. 1: *Breakout*. (https://blog.gamerstuff.fr/google-anniversaire-casse-brique-atari/)

competitiveness further increased Sudnow's urge to play. When he finally breached the brick wall days later, his motivation did not stop. New obstacles were presented in due time, such as an abrupt acceleration of the ball as soon as Sudnow reached the fourth layer of bricks. He wanted to keep playing the game, to get better, to fulfill the challenge the game had poised. His brain was working at top speed. He was experiencing flow.

Flow is even easier to achieve when the individual feels like their work contributes to something greater than themselves. In short, their flow-inducing work must have 'meaning', i.e. relevance for the individual outside of the flow-experience (Nakamura & Csikszentmihalyi 2003: 94). Video games do not seem to fit here, because they have virtually no other meaning than momentary enjoyment for the player. Nevertheless, Nakamura and Csikszentmihalyi argue that the more

flowtime an individual spends with an activity, the more the relationship between individual and activity deepens; the activity gains importance to the individual. The individual will feel that what they are doing benefits them or the world in some way (Nakamura & Csikszentmihalyi 2003: 96). It can be argued that getting better at games and relishing the experiences they provide *is* the meaning of playing video games.

McGonigal applies the term flow to games as she describes “the extreme neurochemical activation that happens in our brains and bodies when we start to play a good computer or video game. [We are] intensely focused, highly motivated, creatively charged, and working at the very limits of [our] abilities” (McGonigal 2011: 40). Video games activate flow in mere seconds, in which McGonigal sees the main reason why video games find such wide appeal among all age groups. Not only professionals who had studied their field of expertise their entire life can experience flow, the feeling is also easily accessible to the general population (McGonigal 2011: 40) and can definitely be invoked in students.

Promoting flow in education seems like an easy feat. As mentioned in the beginning of the section, Csikszentmihalyi’s research has shown that the conditions for flow are moderate challenges, clear goals, and immediate feedback. All of these conditions can be met in school, but there is still room for more. In fact, there are several ways to make school more engaging and further increase student’s flow.

A study by Shernoff et al., which was co-authored by Csikszentmihalyi, examined engagement among High School students and compiled a list of suggestions to create a classroom atmosphere in accordance with flow-theory. They have found that students spend a third of their time in class passively listening to input, whereas only 14% are spent doing something interactive. A teacher should therefore maximize time in which the students’ focus lies on themselves and other students, while minimizing time in which the focus lies on the teacher. Interestingly, individual work is equally beneficial to flow as group work (Shernoff et al. 2003: 172).

Students must also feel a balance between their skill level and the currently posed challenge, in addition to a feeling of relevance of the task. If a student does not see

the point of completing a task, engagement will drop. In fact, much of students' disengagement can be traced back to a "lack of challenge and meaning" (Shernoff et al. 2003: 171).

In accordance to Self-Determination Theory, Shernoff et al. also plead to respect the students' Competence and Autonomy, for example by providing choices and letting the students choose for themselves, while keeping in mind that both overly easy and overly difficult tasks are counterproductive (Shernoff et al. 2003: 171).

Laffan et al. found that flow is closely connected to video games with social features. In-game chats and social interactions were perceived as highly engaging to players of video games (Laffan et al. 2016: 547). Therefore, it seems a good idea for educators to encourage social behavior during class, e.g. activities in which students are forced to help each other. Social elements are so engaging, in fact, that they are one of three reasons why video game addiction can take place; the other two being the distortion of time perception typical for flow, and general unhappiness of the player (Hull et al. 2013: 150).

A study by Ellwood and Abrams, has shown that students feel more engaged and experience more flow when working on projects outside of the school's perimeter (Ellwood & Abrams 2018: 418). They examined two groups consisting of four female students each, all aged 13-14. Both groups worked independently on a project, with the on-campus group working within the school buildings and the off-campus group working outside in the field. Both groups worked hands-on, but the off-campus group had, because they were not in a controlled space, more cognitively demanding tasks to complete (Ellwood & Abrams 2018: 421). The authors recorded that those students working off-campus expressed their engagement more often, had longer lasting on-topic discussions and, most importantly, experienced significantly more flow than the group working on-campus (Ellwood & Abrams 2018: 418).

Similar results were found by Admiraal et al. (2011), who conducted a study on 216 students playing an augmented-reality-game in Amsterdam. They played in teams of four, with two students walking the city with a map of medieval Amsterdam on their phones, and two students in the headquarter, guiding the other two through the game's story. They found that the students were mostly uninterested in the

story, but commonly experienced flow, nevertheless. Furthermore, flow had significant impact on the students' outcomes, which can be tracked back to an element of competitiveness. However, flow did not have any impact on learning outcomes (Admiraal et al. 2011: 1191). The game proved to be more of a competitive play experience than a content-learning experience. Still, the students experienced flow while playing the game, which could mean that letting students explore the field and letting them work with interesting technology is beneficial for students' engagement.

1.4. Addiction and violence

So far, this thesis examined mainly positive aspects of video games, namely motivation and flow. There are, however, negative aspects to games, such as video game addiction and game-induced violence. To grant a level-headed discussion about video games and their educational potential, both positive and negative aspects must be discussed.

Addiction and violence have been subject of discussion in the media for several years (Vitelli 2013; Kleinman 2015; Azad 2019; Jabr 2019), which means that they are among the first associations many people might have with video games. In this section, both addiction and violence shall be outlined briefly, with subsequent discussion about how to handle both aspects in education.

1.4.1 Addiction

According to the Austrian ministry of health, playtime alone is no indication for video game addiction (Federal Ministry for Labour, Social Affairs, Health, and Consumer Safety, n.d.). Instead, video game addiction is only present when the afflicted individual compulsively seeks recluse in video games to a point where they completely neglect other parts of their lives, such as their career or social connections outside of the game (Puhm & Strizek 2016: V). Furthermore, people addicted to video games oftentimes show other psychological afflictions to go with their addiction, such as depression, social anxiety, ADHD, or narcissism (op. cit.: VI)

Video game addicts are not simply addicted to the sensation of playing a game, but rather to specific game-elements. For example, in many MMOs[3], the player is beckoned with the possibility of obtaining rare and valuable items, which makes the player fear that they are 'missing out' should they stop playing the game (King & Delfabbro 2016: 2064), resulting in longer and longer sessions of trying to obtain increasingly rarer items. Others argue that MMOs are mainly connected to gaming addiction because of their "highly social and competitive aspects" (Hussain et al. 2015: 16). Such social aspects can mean that players receive praise and appreciation by their online community, while competitive aspects mean that player experience feelings of Competence, control, and self-efficacy (Puhm & Strizek 2016: V). In short, video game addicts are mostly addicted to the promise of better items, validation from their gaming peers or the feeling of Competence that comes with winning in a competitive game. They are unlikely to be addicted to the sensation of playing a video game.

For teachers, it seems problematic that social and competitive elements are the among the addictive elements on online-games, since interactivity and competition are aspects that best be integrated into class to make class engaging (Doney 2019: 8, 9) and communicative approaches like CLIL are part of the Austrian curriculum for lower secondary schools (Federal Ministry for Education, Science and Research 2018: 9). The question whether communicative and competitive classroom activities could trigger a dormant video game addict's relapse would have to be examined closer, perhaps in the context of a scientific study. However, it is safe to assume that communicative and competitive classroom activities are harmless for video game addicts. After all, school and online-games are no comparable environments, not least because online-games are pursued voluntarily and school involuntarily. Using communicative and competitive approaches in school should be harmless. Using digital media and/or games in school should be harmless, as well, because simply the sensation of playing a video game is not enough to cause serious addiction, as already mentioned.

[3]MMO is short for MMORPG, which is in turn short for "Massively Multiplayer Online Role-Playing Game" It describes games that feature huge virtual worlds in which large amounts of players can interact in real time. A popular example is World of Warcraft.

1.4.2 Violence

Ever since the Columbine High School shooting in the United States in 1999, the question has arisen whether violence among teenagers is linked to violent video games. The Columbine shooters, two teenagers who killed 12 of their peers plus one teacher, had been playing the first-person shooter *Doom* (Disis 2018). Discussions on the connection between video game violence and real-life violence have been heated and inconclusive ever since (Anderson et al. 2010; Ferguson & Kilburn 2010; Bushman et al. 2010). Recently, a study found that the effects of video game violence on teenagers, both beneficial and detrimental, are insignificantly small (Mathur & VanderWeele 2019: 706).

In any case, teachers need not be worried that their teaching may cause one of their students to develop violent tendencies, even if they use gamification strategies in their classroom. Gamification strategies are concerned with video game mechanics, not with potentially violent content. It is therefore impossible for a teacher to accidentally introduce their class to violent video game content. The question of the link between video games and violence is one that exists outside of the realm of gamification altogether.

2. Learning in games (*The Legend of Zelda: Breath of the Wild)*

Chapter 1 discussed the role of motivation and how it can be utilized in education and in video games. Two of the discussed principles were Deci & Ryan's (2000) Self-Determination Theory, which sees motivation as dependent on Autonomy, Competence and Relatedness, and Keller's (1987) ARCS model, which outlines the importance of Attention, Relevance, Confidence and Satisfaction. Both principles understand that the Locus of Perceived Causality (PLOC) must be within an individual, no matter whether the individual shall be intrinsically motivated or shift their motivation from extrinsic towards intrinsic.

The video game industry understands these principles, as well. A successful video game motivates the player to keep playing and rewards them with a feeling of accomplishment. It makes the player willingly learn the game's controls while motivated and engaged. One such successful video game is *The Legend of Zelda: Breath of the Wild* (Nintendo Entertainment 2017), a title enjoying critical acclaim from critics and players alike (Metacritic). It skillfully employs many motivational strategies and works well within the rules established by Deci & Ryan (2000). Before going into detail on how and why *Breath of the Wild* is so motivating to play, the game's premise shall be briefly outlined.

Breath of the Wild is an Action Adventure game, which means that the player takes over the role of a protagonist, in this case named Link, and maneuvers them throughout the plot of the game. In the Beginning of *Breath of the Wild*, Link awakes with amnesia from a century-long slumber and finds himself presented with a task: Princess Zelda is locked in combat against an evil force threatening to destroy the world and she needs Link's help to defeat it. After a cleverly designed tutorial (which will be examined more closely in section 2.2), the player is left with complete freedom to do as they please. The game gives the player nudges into the right direction, but what the player does is up to themselves completely. They can choose to roam the world and find ways to prepare for their final battle, or they can head straight to Hyrule Castle and attempt the final boss fight right away. The player has the freedom to investigate any place they see. Herein lies the reason why this game has received a lot of attention. This game understands how to catch the player's attention and to sustain it, and it gives the player the feeling that every

choice is a meaningful contribution towards the game's end goal. In short, *Breath of the Wild*'s game's design entices motivation.

Fig. 2: *The Legend of Zelda: Breath of the Wild* (http://gimmegimmegames.com/2017/07/zelda-breath-wild-review-100-years-making/)

The reason I analyze this game for its educational assets has already been mentioned in the Introduction: Playing this game inspired me to write this thesis. While playing *Breath of the Wild,* I found myself repeatedly marveling over the great care and great knowledge of game design that went into this game. Few games incorporate so many well-working motivational strategies fit to employ in education. It was clear to me that this was the game of which the education system could learn the most. In this section, I examine several techniques employed by *The Legend of Zelda: Breath of the Wild* which make the game motivating to play and may be applicable to education.

2.1 The open world

The Legend of Zelda: Breath of the Wild features a so-called open world. Open world means that the player is free to explore wherever they please. Any point can be reached, any mountain can be climbed, any place can be visited[4].The open-

[4]Conversely, an example for a non-open world would be *Portal* (Valve 2007), in which the player traverses level after level and can only progress once they complete puzzles.

world-genre is a perfect playground to apply Autonomy (see section 1.2.1.1), according to which an individual needs to have full control over what they want to do and how they want to do it, if they should experience motivation. The Open World genre provides Autonomy like no other genre can hope to achieve, and *Breath of the Wild* does this exceptionally well because exploration seems like a key part of the overall game design. For example, one of the games' main objectives is retaining Link's lost memories by rediscovering crucial locations of his past. The only clues as to where these are, are pictures of things that can be seen from the said spot. Very elegantly, the game thus features exploration as an organic part of the open world game, and even makes it its focus. Despite being one of the game's main objectives, finding the lost memories is completely optional and need only be completed if the player wants to complete it. The player's Perceived Locus of Causality is, therefore, completely within themselves and the player acts out of intrinsic motivation.

Compare another game, *The Elder Scrolls V: Skyrim* (Bethesda Entertainment 2011), in which the player has only little agency when it comes to exploring. Quests usually work as follows: The player is told to retrieve an item from a nearby dungeon, the player has a marker on-screen that guides them directly to said item, the player follows mindlessly without any true exploration and finally returns to deliver the item, again guided by an on-screen marker. Arguably, *Skyrim*'s open world exists mainly to make the player traverse land so that the game seems to have more substance. While *Skyrim* holds the player's hand, wasting perfect opportunities to give the player some Autonomy, *Breath of the Wild* capitalizes on exactly that: The Player's Autonomy. They are given nudges and hints, but the player is completely in charge of navigating, exploring and, most importantly, finding their goal.

I have previously talked about ways to raise Autonomy in school, especially in section 1.2.1.4. There, I talked about a school type in which students are free to roam the building as they please and engage with materials they find interesting. In that chapter, some ideas were my own, such as exams that are designed for repeated failure and subsequent learning. The idea about a building that is free to roam, however, is lifted directly from Montessori. In fact, I have once visited a

Montessori school just outside of Vienna[5] and was intrigued to learn that students could do just what I am advocating now: Move about the building at their own pace and learn what they find interesting, without any teachers holding their hand and instructing them exactly where to go and what to study, like *Skyrim* would. Instead, the students were expected to orient themselves, find the subject that they would like to investigate, and then learn at their own pace, resembling the approach employed by *Breath of the Wild*. This Montessori school seemed like a perfect application of the open world video game genre into education.

Of course, not every school can be designed for students to roam freely. In a standard Austrian school, giving students absolute free will is not feasible. Luckily, giving student absolute free will is not necessary. Giving them a perceived feeling of Autonomy can be sufficient. Jiménez Raya and Vieira have presented several methodological ideas that can be used in everyday language education without any preparation, that can increase the students' perceived Autonomy (Jiménez Raya & Vieira 2015: 3). They propose reserving five minutes of every lesson for the students to engage in small talk, about any topic they want to. They propose having students compile their own lists of questions and, as a teacher, covering them in subsequent lessons. They propose granting the students a minute of thinking (and chatting) time after posing a complicated question. They propose having the students critically think about activities done in class. These ideas introduce Autonomy-inducing elements in class, during which students get the feeling that their participation is welcome and that their input is heard, at their own discretion. In *Breath of the Wild,* the player feels like they are acting on their own accord, yet they do only what the game developers permit them to do: preparing for the final battle, pursuing side quests and ultimately attempting to fight the final boss. The player feels like they enjoy true Autonomy, but in reality, they only have Autonomy within a given framework. Similarly, teachers are not expected to provide true Autonomy to their students. Giving them Autonomy within the restrictions of the school system is all they need.

[5]Said school can be found at http://www.bildungshof.at/neueschule/.

2.2 The tutorial

A tutorial is the initial segment of a game, in which a player can familiarize themselves with the characters, the setting and the controls. Most games make the tutorial an interactive experience serving as a prologue to the story of the game. As an example, take again *Skyrim,* whose story begins in a village that is initially isolated from the rest of the game. It is here that the player learns to navigate the world, learns the mechanics of the game and is introduced to the story by encountering the game's main villain. However, much like in the rest of the game, there is a problem*:* The player is constantly told what to do and where to go in order to progress. Here is where *Breath of the Wild* does things differently. As already mentioned, the game's focus lies on exploring the world, which is reflected in the tutorial. The next paragraph shall, step by step, illustrate how *Breath of the Wild*'s tutorial works[6] and how Self-Determination Theory and ARCS are represented. Afterwards will be examined what pedagogical conclusions can be drawn.

Link awakes from his century-long sleep in a cave. After finding basic clothing to wear, he makes his way out of the cave, which leads him to a shallow slope upwards that has collapsed, resulting in a low wall. Here is the first instance of the game organically teaching the player the basics of navigation. By walking towards the wall and pressing the jump-button, Link grabs on to the wall and can now be controlled by the player to climb it. The game poses a situation in which the player's natural first instinct, walking toward the wall and jumping, results in the player learning a new useful skill: climbing. The player has acted with Autonomy, trying out to scale the wall by themselves, and was immediately rewarded with positive feedback, which bolsters the player's Competence. Additionally, it primes the player to think that climbing will be an important mechanic in the game, which will be proven true. After climbing the short ascent, Link emerges from the cave and is presented with a view of the beautifully designed game world (see Figure 2). This view again primes the player to know what to expect: All this land is here to be explored. Before, however, the player must find a way down of their vantage point. Soon they understand that they stand on a large, high plateau that cannot be left without plummeting to death. At this moment, an NPC steps in to alleviate the

[6]YouTuber TetraNinja (2017) can be watched playing *Breath of the Wild*'s tutorial here: https://www.youtube.com/watch?v=Ktjdg3zgRzk

player's cluelessness, much like a teacher would "give personal attention to students" (Keller 1987: 5), should one of them feel lost. The NPC, a wise old man, takes Link to another vantage point where all of the plateau can be seen and gives Link instructions. In order to leave the plateau, Link must find four shrines and solve the tasks he will find there. The old man does not mark the shrines on the player's map. Instead, he shows the player what the shrines look like and remarks that vantage points are useful to scout the area and find shrines. He nudges the player to find the shrines autonomously.

At each shrine, the player receives a different tool[7] that can be immediately tested by solving the shrines' puzzles, teaching the player how to operate the tools and showing them how to recognize game world elements the tool can interact with. The game employs a pedagogical approach: The player is taught the usage of a new tool and can immediately try the tool out in a controlled space, which plays into the player's Satisfaction (Keller 1987: 5). Afterwards, the player is encouraged to find creative ways to use the tools in the rest of the game. Additionally, the shrine-puzzles encourage flow. In chapter 1.3, flow is mentioned to appear when moderate challenges, clear goals, and immediate feedback are given. The shrine-puzzles provide all three of these. Furthermore, because shrine-puzzles do not only appear in the tutorial, but later on, as well, flow is promoted for the entirety of the game.

Even while making their way to the shrines, the player is confronted with organic learning opportunities. One shrine, for example, is located in an area with high altitude and low temperatures. Should the player venture there, they will immediately see Link freezing and his health bar depleting. They are therefore compelled to find a way to survive the harsh climate, either by finding other gear, spicy food, or by lighting a fire. The player is confronted with small challenges that will become real problems later on if the player is not prepared. The game is teaching the player "how to develop a plan of work that will result in goal accomplishment" (Keller 1987: 5). Even more: The game is making the player teach themselves to develop a plan.

[7]These tools are the basis of interacting with the game world. Among them are a tool to move metal objects, a tool to suspend large objects in time and redirect their momentum, a tool to erect ice pillars in water and a tool to create bombs for controlled detonations.

Once Link has scouted and reached all four shrines, the old man will meet him, reveal himself as the ghost of the dead king of Hyrule and bestow Link with his quest: Helping his, the King's, daughter Zelda defeat an evil force out to destroy the world. He surrenders his paraglider, another main vehicle of navigation in this game that complements the climbing mechanic introduced earlier, so that Link can be on his way. This is where the true game begins and the player is left with the feeling that with whatever the game will confront them, they will be able to handle.

The tutorial's pedagogical value is the following: Firstly, the game teaches the player the use of tools in ever growing steps. Initially, the player only uses their new tools in the shrines, environments that are designed to be belabored with each tool. Then, the player is encouraged to try out the tools in the tutorial area, where more creative usages of the tools are needed. At last, the player is let loose on the game world to use their tools in whichever creative way the player needs to achieve their goals. At a pace the player is comfortable with, they are encouraged to use their skills in larger and larger scales. These ever-growing steps conform to Keller's idea of Need Matching, which belongs to Relevance. Part of Need Matching is to "provide opportunities to achieve standards of excellence under conditions of moderate risk" (Keller 1987: 4). The player will have tried out each tool several times within the tutorial before using the tools in the game proper. In the context of schools, this means that teachers should familiarize students with a new item (say a piece of vocabulary) in small, isolated contexts first, after which they can progress to increasingly complex environments before the student can finally use the word creatively in the real world. Luckily, many teachers take this approach to heart already.

Secondly, the tutorial area, a controlled space in which the player takes their first steps, is modeled to be a miniature version of the true game world. Just like the game world, the tutorial has shrines, lakes, snowy areas, differently strong enemies and so forth. When the player is confronted with similar problems in the game world, albeit in a larger scale, the player immediately knows what to do. Doney (2019: 6) agrees that players show the best learning outcomes if the learning situation resembles the real-life situation. Therefore, in school, the students' learning environment should resemble the corresponding real-life environment as closely as possible. When teaching students vocabulary about clothes, for

instance, presenting them with real-life clothes can prove beneficial. When emulating a panel discussion, it can help to make the classroom look like a real-life panel as closely as possible. Luckily, these are approaches employed by many teachers, as well.

Thirdly, the tutorial does not feel separate from the game world. It is cleverly designed to be a confined space, but because it is an elevated plateau, the player can always see the vast expanse of the world, which results in a feeling of freedom and the urge to walk about and explore. The reward for completing the tutorial, that is, being able to roam the world freely, is always beckoning. Hence, the player is constantly reminded why they are attempting to complete the tutorial in the first place. It is the game's way to "state explicitly how the instruction relates to future activities of the learner" (Keller 1987: 4). In school, it may prove a valuable tactic to remind the students why they are learning, ideally with a goal that is dear to themselves, to increase motivation.

As already mentioned, the moment in which the player receives the paraglider and is released into the game world is, at least for me, a moment coined by a feeling of confidence. Because the tutorial showed me all I needed to know in order to survive in the game world, I was eager to see what the game had in store for me, and I was motivated to best the challenges that were still to come. Deci and Ryan mean nothing else when they speak of Competence (Deci & Ryan 2000: 235). After having completed the tutorial, the player feels confident in their abilities because the game has provided ample positive feedback: Every shrine rewards them with special items, every puzzle they solve triggers a satisfying audio-cue, and at the end of the tutorial, the player receives the paraglider, a distinct form of transportation, as a token for their efforts. All these measures result in an intrinsically motivated and competent-feeling player eager to experience the rest of the game.

2.3 The unclutteredness

With unclutteredness, I refer to how clean and non-distracting the gaming experience is. *The Legend of Zelda: Breath of the Wild* understands where its focus lies (namely exploration) and implements only features that are beneficial for this focus. The game world has many noticeable landmarks that help the player orient

themselves within the game and ensure that the player's attention is where it should be: The game world. The player's map does not relinquish any information on treasure or collectibles and there are no location markers guiding the player to points of interest. Instead, the world features many towers and vantage points from which the player can scout the area, deciding for themselves what they are looking for and what they want to explore next. The only location markers on the map are the ones the player sets themselves as a result of exploring. They create their own world map indicating what is important to them. In a sense, they 'own' the world they explore, which is important since ownership is an essential element of learning (Balli 2009: 54). To facilitate learning, students must feel like the learning space belongs to them. They should be allowed to leave their mark on their surroundings; walls, ceilings, furniture, even the floor can be a blank canvas for students to display their drawings, writing, and other things they have created. The students adopt the place as their own, just like a player of *Breath of the Wild* makes the world their own by exploring and recording findings as they see fit.

Compare another series of open-world action-adventure games: *Assassin's Creed* (Ubisoft 2007). In the *Assassin's Creed* games, the player assumes the role of a fictional cult member of the Assassin Brotherhood who conducts political assassinations in various historical time periods. The main means of transportation is scurrying over rooftops and through alleys. These games are, too, open world games with a focus on exploration, but they employ the opposite approach of *Breath of the Wild:* In *Assassin's Creed,* the game map shows the player everything from the start[8], which means there is no exploration to speak of. There is nothing for the player to discover since everything can already be seen. The location of all side quests, interactive elements, and collectible items is visible on the map. Subsequently, the player ends up not exploring, but running errands. They are working through a list of things decluttering the map. The player feels overwhelmed by a large number of seemingly trivial things, distractions that mostly have no relevance to the overall experience. The player's motivation dwindles.

[8]In truth, the player must unlock a specific area's map by climbing towers and vantage points. Immediately after, the map shows everything there is to do for the player. Still, the player will find themselves chasing location markers rather than exploring.

In the literature, there exists the idea that a good teacher should “focus[…] on process rather than answers” (Jaffe et al. 2019: 1). The idea is that a teacher should create an environment in which students do not chastise other students for giving a wrong answer. Instead, all students should learn from the thought processes of their peers, resulting in respectful discussion and critical reflection (op. cit.: 5). While Jaffe et al. give perfectly sound advice, I must concede that I initially misunderstood them. However, my misunderstanding may lead to a valuable insight for teaching. My misunderstanding was that *teachers,* not students, should focus on process rather than results. Jaffe et al. seemingly made the point that ‘doing-something’, was more important than ‘having-done-something’ and should focus on the activity rather than the result. An anecdote to clarify: During my studies, I once observed a lower secondary school teacher who would do nothing but work through the textbook. There was little interaction, little engagement, the teacher simply worked number for number, page for page, through the book. It seemed clear to me that his goal was getting the book done by the end of the year. Apparently, he placed value on ‘having-done-something’, rather than ‘doing-something’. Just like the *Assassin’s Creed* games, he presented a list (in the game’s case, the map. In the teacher’s case, the textbook) and had the students work through it. He would likely have fared better by asking his students what they wanted to learn and how they could be engaged, rather than what trivial task he could give them next. Had he adopted the approach of *Breath of the Wild*, he would have decided on a focus for his teaching and planned his activities around said focus, minimizing distracting items in the process and upholding the students’ sense of wonder.

2.4 The Korok Seeds

While exploring Hyrule's different environments, the player may stumble upon a tiny puzzle. Such puzzles are hidden throughout the entire world and may take different forms. They may be a circle of rocks with one rock missing; they may be circles of lily pads in a pond, which the player must swan dive into; they may be hollows in the ground into which the player must shove a boulder. Puzzles like these can be found in abundance[9] and they are very easy to complete. Each time the player solves one such puzzle, a Korok appears, a little forest spirit, who

Fig. 3: A Korok from *Breath of the Wild.*
(https://gamingph.com/2017/04/korok-seeds-map-legend-of-zelda-breath-of-the-wild/)

congratulates the player and hands them a reward: A Korok Seed. The Korok Seeds can later be exchanged for further rewards.

The Korok Seeds are a clever element of game design. The associated puzzles are ubiquitous enough not to stand out, yet peculiar enough for the player to investigate. Because the puzzles are so easy, the player quickly realizes that, yes, they are in fact dealing with a puzzle, and the puzzle's solution presents itself right away. Next, a playful jingle can be heard, the Korok appears and the player is rewarded with a Korok Seed. Jingle and reward can be seen as positive feedback,

[9] The exact number of puzzles is 900 (Plunkett 2017).

affirming the player's actions and motivating them to keep going. The Korok Seeds provide the player with an "elevated feeling of efficacy and success [which] should be related to Competence" (Rogers 2017: 447). Worded differently: Encountering a Korok triggers the player to feel fiero, the emotion of triumph that is so crucial for motivation in both playing and learning. Because the Korok Seeds are abundant throughout the world, the player has ample opportunity to be motivated again and again.

For a teacher, understanding the Koroks' function is valuable. They provide tiny instances of positive feedback, making the player feel triumphant and giving them the feeling that they are going the right way. Keller suggests including "problem solving activities at regular intervals" (Keller 1987: 4), to keep the students' attention and provide them with small instances of triumph. Such small instances of positive feedback may just be what some students need to keep going, especially if they stumble upon such feedback randomly by following their curiosity, rewarding them for their desire to learn.

2.5 Learning in games - conclusion

The Legend of Zelda: Breath of the Wild, as previously mentioned, successfully employs several strategies to motivate the player and sustain their motivation while they play. The open world is designed in a way that captivates the players attention and makes them want to explore. The tutorial prepares the player excellently for the journey ahead and leaves them feeling competent. The map is uncluttered and clean, making the player focus on exploring and allowing them to make the world their own. The Korok Seeds give the player a repeated feeling of fiero, a motivational boost that further fuels the player's motivation. Every element in the game is carefully added to increase and satisfy the player's sense of wonder. These strategies can be adapted by teachers to engage students. The perfect place to learn how to engage a student is video games, with *The Legend of Zelda: Breath of the Wild* leading the way.

3. Gamified learning (*Duolingo*)

3.1 Gamification in apps

As mentioned in 1.1, gamification can be defined as the introduction of game design elements into non-game contexts, or the increasing of a task's value by introducing challenges that result in a feeling of accomplishment. Gamification means making tasks more engaging by utilizing knowledge about motivation (some of which has been examined in 1.2). In recent years, there has been an influx of apps that use gamification strategies to motivate users to keep using them. One of the world's biggest exercising apps, *Fitocracy,* uses badges, levels, and points to engage its users. Social network functions let the user update their status, like other users' statuses and leave comments, giving the workouts a social dimension (Koivisto & Hamari 2014: 181). Austrian brewery Stiegl recently launched an app that gamifies drinking their beer; users get a digital foam-beard that grows with every Stiegl-beverage consumed. The longer the beard, the better prizes can be won (Karg 2019: 66). The app *Forest* boosts the user's productivity by letting them plant a virtual tree that only grows as long as the phone is not used. Every tree big enough can be planted into a virtual forest that represents the user's productivity (Haidrani 2016: 15).

All these apps use different strategies to motivate their users. Pinto Cechetti et al. compiled a list of the most prevalent gamification strategies featured in the literature about gamification:

Strategies	**Definitions**	**Used in sources (%)**
Points	Ratings for achievement of tasks	15.1
Goals	Mandatory tasks to be performed	11.3
Rewards	Bonuses for achieving certain goals	9.4
Badges	Identification of collection of achievements	8.5
Feedback and Characters	Game assistance for task accomplishment	7.5
Levels	Stages to be reached, advancing to the next	7.5
Social interaction	Direct competition with other application users	7.5

Achievements	Scope and unlocking objectives	6.6
Monetary elements	Treasures, medals, coins and virtual bonuses	6.6
Leaderboard	Ranking with the best user performance	5.7
Story	Plot of activities in the application	14.3 in total
Progress	Toolbar to track activity progress	
Penalties	Points or penalty loss for error committed	
Difficulty levels	Game mode between easy, medium and hard	
Challenges	Obstacles to be overcome	

Table 1: Gamification strategies (Pinto Cechetti et al. 2017: 5)

It is notable that most of these gamification strategies fall under Deci and Ryan's category of 'Competence' or Keller's category of 'Confidence' (see 1.2). Points, rewards, badges, feedback, levels, monetary elements, progress, and difficulty levels can be counted towards 'Competence' because they show the user their progress, a constant reminder of the work already finished. Goals, achievements, and challenges fall under 'Confidence' because they make the user confident that the next milestone can be reached. Many gamification strategies fall under both categories at the same time, such as rewards, badges and achievements, which validate the user for getting them and beckon the user to keep going and receive them. Most other categories, such as social interaction and leaderboards, can be counted towards Deci and Ryan's Relatedness, providing a social backdrop.

Also notable is the discrepancy that the third most popular gamification strategy is reward, although rewards have negative consequences for the user's motivation (Deci & Ryan 2000: 234). Perhaps more research must go into this discrepancy to decide whether rewards are an effective gamification strategy or not.

Based on the list in Table 1, it is apparent that gamification works mainly via three elements: Positive reinforcement for already finished tasks, reachable goals that ignite the user's ambitions, and a social backdrop that makes the tasks feel relevant.

3.2 Gamification in *Duolingo*

Duolingo is a language learning app with more than 100 million downloads on the Google Play Store[10]. It works via learning modules (by the app referred to as 'skills') which, when completed, unlock more learning modules. The player completes them by doing small exercises, such as translations or vocabulary tasks. *Duolingo* benefits from the fact that its users use the app voluntarily, which means intrinsic motivation is already given. Still, the app features several gamification strategies that help engage the user. These strategies mirror the categorization in table 1 above and many can also be categorized in accordance to Self-Determination Theory. While most strategies work in a way that elicits positive feelings in the user (which shall henceforth be referred to as 'positive reinforcement'), some strategies elicit unpleasant feelings of urgency or obligation (henceforth referred to as 'negative reinforcement'). To illustrate gamification in language learning, this section will examine the gamification strategies employed by *Duolingo*, how they can be categorized and how they affect the user. While some strategies correspond to the strategies in table 1, some strategies are employed that were not described by Pinto Cechetti et al.

For this analysis, *Duolingo's* browser version will be analyzed. Most gamification strategies employed by Duolingo can be classified as **positive reinforcement**, meaning their purpose is to communicate a rewarding feeling to the user. Among them are the strategies that can be categorized through Self-Determination Theory and the ARCS-model.

Strategies appealing to the user's **Autonomy** make the user feel in control over what they are learning. After choosing a language to learn, the user can complete an optional placement test if they feel adept at the language already, causing a feeling of control. If the user has never attempted to learn the chosen language before, they must start with the first skill, 'basics'. Here, the user is asked to guess basic vocabulary guided by pictures. When the user is ready for basic sentence structures, they are asked to provide translations from the target language to the user's language. The user can choose their method of input, whether they would rather type the words via their keyboard or choose the correct words from a 'word

[10] https://play.google.com/store/apps/details?id=com.duolingo&hl=en_US (19 Nov. 2019)

bank'. If the user decides to type their own words, typos are not regarded as mistakes, which diminishes possible feelings of helplessness. Another feature is the report option with which users can provide feedback on specific learning items and therefore gives the user a feeling of participation. Additionally, for every lesson the app provides theoretical background which the player may read at their own discretion.

Strategies appealing to the user's **Competence** elicit a feeling of capability. The app supports the user's Competence by its structure: All skills are arranged on a skill tree, which makes the skills look organized and manageable. After the user completes a skill, more skills are unlocked. It is reminiscent of the category 'levels' featured in table 1, describing features that make the user "reach stages" and "advance to the next" (Pinto Cechetti et al. 2017: 5). An unlocked skill turns from grey to colorful; as the user puts work in each skill, its color changes. Once the user has completed a skill, the skill's color changes to gold. Therefore, the user can constantly see how far they have come and have evidence of their capabilities. When the user first starts using the app, all locked skills are visible so that the user understands how much there is to learn. The app avoids overwhelming the user by placing checkpoints after several skills so that the next checkpoint always feels within reach.

Strategies appealing to the user's **Relatedness** give the app a social dimension. In *Duolingo*, these strategies are highly competitive. The user can become friends with other users and see how much they have progressed in relation to the user themselves. Doney argues that competition "can be a motivating factor and encourage learners to repeat tasks in order to improve" (Doney 2019: 3). In *Duolingo,* competitiveness is carried to an extreme because the incentive to repeat tasks is not to improve, but to ascend in the ranking. Next to friends, there is also a weekly leaderboard with 50 random *Duolingo* users from all around the world. The leaderboard provides "direct competition with other application users" (Pinto Cechetti et al. 2017: 5) and serves to "rank[…] the best user performance" (ibid.) The best participants get promoted to a more advanced league, which has no impact on the learning level but only serves to increase competitiveness. Next to competitive strategies, there is also a cooperative strategy: For almost every exercise, there is a discussion forum where users can lead discussions and help

each other understand the target language. It ties into Keller's concept of relevance, according to which students learn best if they can study in a way that accurately reflects their learning (Keller 1987: 3). In the discussion forum, users can ask specific questions without inhibitions.

There are several more gamification strategies employed by *Duolingo* that do not directly correspond with Self-Determination Theory. One such strategy is the collecting of experience points (in *Duolingo* referred to as 'XP'), which the user receives for every completed skill. Collecting experience points, as opposed to receiving letter grades, is highly motivating because it does not simulate the feeling of losing something but of gaining something (Gehringer 2013: 1545). Likely because collecting points is so motivating, they are the most widely used gamification strategy in the literature (Pinto Cechetti 2017: 5).

Next to experience points, the app features several other types of collectibles to keep users engaged. While the user completes different skills, they are awarded crowns that do nothing but to raise a number at the top of the screen by one, insinuating to the player that they are collecting crowns. Similar to the previously introduced experience points, they do nothing other than motivate the user by way of collecting.

The user can also collect a digital in-app currency named 'lingots', which can be exchanged for items. They are an example of the monetary elements mentioned by Pinto Cechetti et al. (2017: 5). Often, the sole purpose of game currency is to avoid inconvenient features deliberately implemented by the designers (Asadi & Hemadi 2018: 110). *Duolingo* is guilty of this; out of three items purchasable with lingots, one is a so-called 'Streak Freeze', which prevents the user from losing their streak. The streaks are an example of negative reinforcement and shall therefore be discussed below. The other purchasable items are additional gamification strategies: one is a wager called 'Double or Nothing', which, again, shall be discussed below, while the other is a timed practice mode for the user to test themselves. In any case, virtual in-app currency can have the same motivating effect as experience points, only the currency has the additional purpose of being spendable on items, which adds an extra layer of value and desirability.

Duolingo also features achievements, which are milestones that the player can reach by using the app. These achievements can entail earning a certain number of XP, spending a certain number of lingots, using the app on weekends, et cetera. In the literature, this gamification strategy is referred to as 'badges' and is defined as "Identification of collection of achievements" (Pinto Cechetti et al 2017: 5). The idea is to give the player an overview of things they have already done and incite them to complete the collection of achievements, therefore motivating them to keep using the app. After all, finishing a collection creates a "positive feeling of fulfillment", after which the collection can "be displayed or discussed as a way of creating greater interest in the items" (Kreuter 2017: 11). Next to the psychological want to finish a started collection, the achievements also have a social aspect since *Duolingo* users can converse on their achievements and compete in finishing their collection.

Many strategies employed by *Duolingo* fit into the 'Feedback and Characters'-category. It is defined as "Game assistance for task accomplishment" (Pinto Cechetti 2017: 5), which is definitely present in *Duolingo*. Whenever the user attempts an exercise and is unable to recall a word, *Duolingo* provides assistance in form of the translations of every word, both in isolation and in context. However, the translation is only displayed if the user hovers their mouse over a word or, in the mobile version, taps the word with their finger. Furthermore, the app features a very prominent character, an owl named Duo, who is also the app's mascot. Every few exercises, Duo appears and gives the user words of encouragement, a positive form of verbal feedback. These words of encouragement are even context-sensitive, as they differ depending on the user's performance: If they give right answers, Duo will praise the user. If they give wrong answers, Duo will encourage the user to keep going.

Assistance and words of encouragement are strategies suggested by Keller to provide learners with satisfaction. He says good strategies for learner satisfaction are "giv[ing] verbal praise for successful progress or accomplishment", "provid[ing] motivating feedback (praise) immediately following task performance" (Keller 1987: 5), which is taken care of by Duo the owl, and "provid[ing] informative, helpful feedback when it is immediately useful" (ibid.), as illustrated by the ever available translations to each word.

Next to positive reinforcement, *Duolingo* also utilizes **negative reinforcement**, meaning strategies that trigger a feeling of stress or obligation in the user, prompting them to keep using the app. The most prevalent negative strategy is the streak. The streak measures for how many consecutive days a user uses the app, starting at zero and counting upwards for every day the app is used. As mentioned above, the user can spend lingots to buy a 'streak freeze', which sustains the streak for one day. If a user fails to use the app for another day thereafter, the streak is reset, and the user must start at zero. The user feels omnipresent anxiety of losing their streak and returns to the app because of a sense of obligation, not because of a desire to learn, or even play. The streak therefore seems to diminish motivation.

The 'x in a row'-bar is similar in nature to the streak. Dubbed 'x in a row'-bar by me, it appears when a user completes exercises. The bar shows the user's progress in the current lesson; each time the user answers two questions correctly, the bar shows the message "2 in a row!" with increased numbers accompanying every consecutive success. It exerts pressure on the user not to guess incorrectly because if they do, the felt progress on the 'x in a row'- bar vanishes. The thought behind the bar is likely to minimize guessing and having the user draw from their knowledge but it is stressful, nevertheless.

Another similar strategy is the golden frame, which can be found on the skill tree. Once a user starts doing exercises within a skill, they will notice a golden frame growing around the skill. When all exercises within a skill are done, the frame surrounds the skill entirely, suggesting a sense of completeness. The longer the user devotes no attention to the skill, the more the golden frame depletes, conveying a feeling of loss to the user. The only way of replenishing the golden frame is by repeating exercises.

The approach behind streaks, 'x in a row'-bar, and golden frame is to provide the user with something rewarding and then take it away, which seems counterproductive. Surprisingly, the streak has proved to have beneficial effects on user commitment and user motivation, as suggested by Huynh et al. (2018: 1). They claim that the streak makes the app attractive for users who had already gotten used to the achievements provided by the game.

Another negative reinforcement strategy is an item that can be bought with lingots: It is labeled "Double or Nothing" and is practically a wager. The user can bet five lingots that they would use the app every day for one week. If they succeed, they receive twice the amount. If they fail, they have wasted five lingots. Admittedly, the decision to engage in the wager is up to the player completely, yet it is still a tool for the app to exert pressure on the player, resulting in motivation to use the app, but also resulting in stressful learning behavior stemming from a sense of obligation.

In conclusion, *Duolingo* features a plethora of gamification strategies, most of which make the experience pleasant. Positive reinforcement gamification strategies include awarding the player XP, giving them badges, and letting the player progress through a laid-out system, which boosts the player's motivation. Unfortunately, the positive reinforcement strategies are overshadowed by negative reinforcement strategies that punish the player for failing to use the app daily or guessing wrong in exercises, which exerts stress on the player, ultimately making usage of the app tedious. Another problem is that the app insists a lot on repetition, which renders the tasks repetitive very quickly.

There is also the problem that, because the app insists on repetition a lot, the tasks get repetitive very quickly. The repetitions could be implemented differently, for example by designing specific repetition-skills, that include exercises from several skills but change the order or the context. Repetition could be designed to be more engaging.

3.3 Ethics in gamification

The final few *Duolingo* gamification strategies discussed in the previous section foster the supposition that gamification may be ethically questionable. Bogost, a game designer, sees in gamification nothing other than a "distorted version of behavioral economics, one dressed up as gaming in order to appear cooler and more appealing to potential sector customers" (Bogost 2015: 72). He is mainly concerned with the use of gamification for marketing purposes, not education, but he still sees gamification as principally manipulative: "For gamification, games are not a medium capable of producing sophisticated experiences […], but merely a

convenient rhetorical hook into a state of anxiety in contemporary business" (op. cit.: 76).

Kim and Werbach see a problem with gamification as soon as the user's Autonomy is inhibited, the user or any other person is harmed, or any involved party document negative developments regarding their character (Kim & Werbach 2016: 161).

Regarding Autonomy, Kim and Werbach allow that gamification "can be viewed as a means of shaping actions without conscious rational consideration" (op. cit.: 164), but in order to truly be manipulative, gamification would need to additionally prevent the user from self-reflecting, and therefore undermine the user's Autonomy without them being aware, explicitly mentioning that teachers who use positive grades as incentive for their students cannot be considered willful manipulators (ibid.). Teachers can rest easy gamifying their lessons, since student Autonomy is a central aspect that should be increased by gamification (see section 1.2.1.1)

Kim and Werbach are also concerned about the physical and psychological harm gamification may procure. They present several examples of instances where gamification has negative repercussions, among them a jihadist recruitment website that utilizes gamification strategies, a hotel in California featuring a leaderboard showing their most diligent employees, causing severe stress and humiliation among the lesser diligent ones, and an online tool by the Israeli Defense Force that rewards internet users for sharing their content, which is, essentially, a propaganda tool (Kim & Werbach 2016: 165/66/67). However, Kim and Werbach understand that the ethical issues stemming from these examples exist outside of gamification; the problem are the intentions of those using the strategies. Seeing as it is unlikely for physical or psychological harm to come from gamification strategies employed in school, as long as the teacher does not resort to negative reinforcement strategies, the implementation of such can be considered ethically sound.

4. Empirical part

4.1 Purpose of this study

The purpose of this study was to find out what gamification strategies were interesting to students between 14 and 16 years old, what strategies they are already familiar with, and how practical they think the strategies are.

As guidance, Doney's (2019) study was used, in which she analyzes earlier studies on gamification and compiles a list of eight categories in which gamification strategies can be sorted. She is specifically interested in gamification in the context of learning, with special interest on e-learning experiences. Her eight categories are:

- **Challenge:** Students should be presented with goals that are difficult enough to stretch the students' abilities, but simple enough to be achieved. Doney suggests acknowledging students when they complete challenges, for example by handing them badges or rewards (op. cit.: 4) Acknowledging students' achievements would also boost their competitiveness, another category on the list.
- **Feedback:** Two styles of feedback can be used: immediate and delayed feedback (op cit. 5). Both have advantages and disadvantages, depending on the activity.
- **Interaction:** Students can either interact with other students, a facilitator (like the teacher), or with a piece of equipment. If students interact with each other, they may work together in teams or compete against each other. Notably successful are students when tutoring others, especially concerning how long they retain the learned content (Halpern et al. 2012: 98).
- **Representation:** Two things fit the representation category: On the one hand, representation can refer to the game world within a game. Games set in a fantasy environment, for example, "may lead to greater learner engagement" (Doney 2019: 6). On the other hand, representation can refer to the game's immersion level, meaning the "perceived realism of the situation" (ibid.). Realistic situations may therefore be beneficial for learning;

situations can even be simplified as required, as long as the choices made by the student have sufficiently realistic consequences (Misfeldt 2015: 186). This thesis shall focus on Doney's first understanding of representation: the idea of a fantasy game world, in which learning takes place. The reason for this is that asking students for their opinion on fantasy game worlds will lead to more interesting insights than asking them about sufficiently realistic situations mirroring real life, especially since roleplaying everyday situation is already part of many a teacher's repertoire.

- **Reflection:** It is important for students to reflect on their choices and their obtained knowledge, to link said knowledge to the real world (Garris et al. 2002: 455). A well-designed video game gives the player the opportunity to see and reflect on the consequences their actions have. Similarly, there must be ample opportunity for reflection in school.
- **Competition:** Competition is a good way to motivate students, since it is based on interactivity, both with other students and the activity itself. The students' abilities and goals must always be considered when setting up a competitive task (Doney 2019: 4).
- **Control:** Students should be able to influence their learning, for example by making meaningful choices that may influence the outcome of their learning. For the teacher, it is important to provide feedback based on the student's choices (Doney 2019: 5).
- **Rules and Goals:** Clear goals that are linked to students' learning outcomes can be beneficial for the students' focus, since blindly scoring points inhibits reflection and learning (Rieber & Noah 2008: 88). The 'rules and goals'-category is closely tied with the 'challenge'-category, as a teacher must keep the students' possible learning goals in mind when designing challenging tasks.

  This category is not represented in the survey for this thesis, because asking students whether they would enjoy an activity designed with clear rules and goals would be redundant. After all, clear rules and goals should be employed by any teacher to provide continuity in the classroom (See Delceva-Disdarevik 2014: 52).

Next to these eight categories, I would like to introduce an additional category:

- **Progression:** In video games, players feel motivated by a sense of progression, be it a number of levels that has already been bested or a score that has so far been accumulated. Referring back to 1.2, progression plays into the concept of Competence; if a student sees how far they have come, they will feel competent in light of what they have already accomplished. It is therefore a relevant category for this survey. In addition, the category allows me to ask the participants about a gamification element that I am interested in: Lee Sheldon's experience point (XP) system (Sheldon 2012: 31).

4.2 Method

Data was gathered by means of a quantitative survey. It was an online survey hosted on SoSciSurvey.de and was conducted in German to accommodate the presumed first language of most participants. The survey consisted of eight questions, each corresponding with one of Doney's categories outlined above. As mentioned, the category 'Rules and Goals' was omitted, but a new category named 'Progression' was added, resulting in eight questions total.

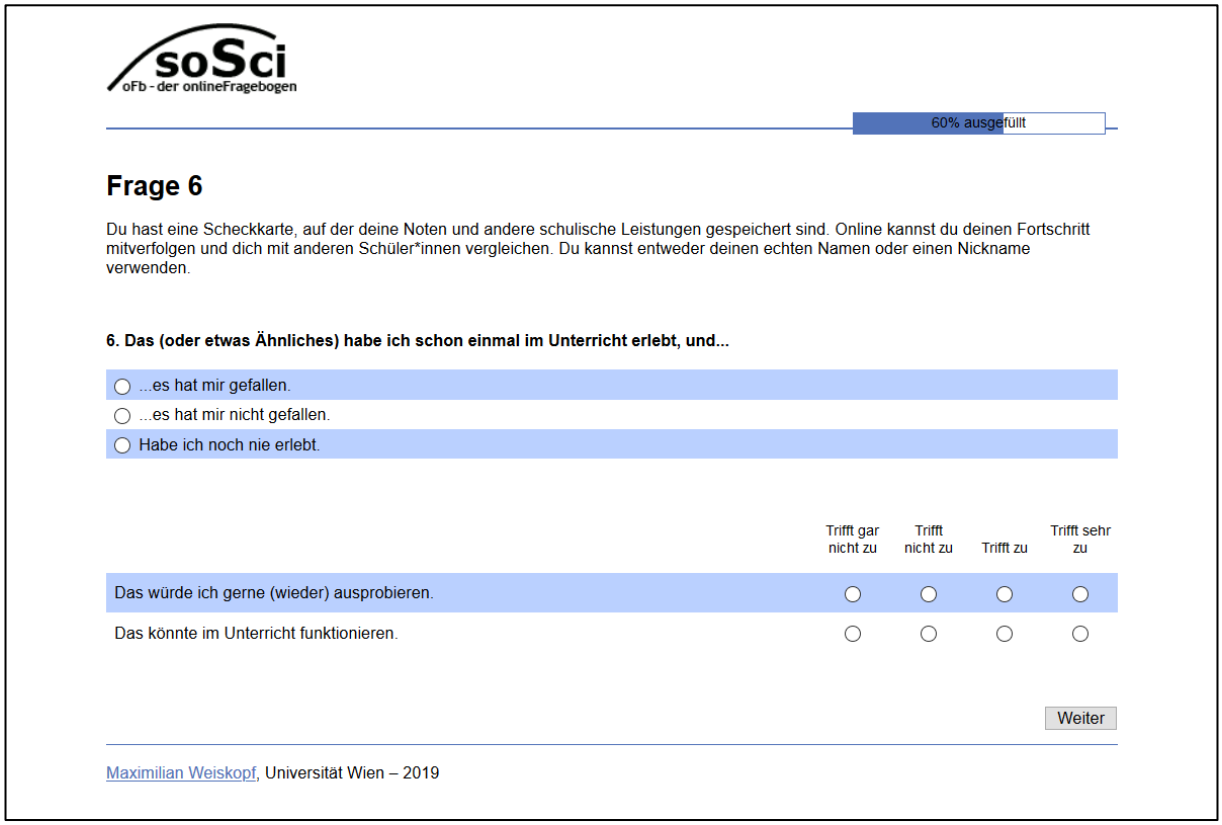

Fig. 4: Example of a survey question.

Each question consisted of a short prompt outlining a concrete example of a strategy representing the corresponding category, followed by three interactive elements for participants to fill out: Whether they already encountered such a strategy, how willing they would be to try it out (again), and how well they think it would work in an actual classroom. Each question had the same setup, with only the prompt changing every time.

To reduce the participants' potential bias, the word 'gamification' was never used in the study. Instead, the gamification strategies were strictly referred to as 'ideas to make class more engaging' ("Ideen, wie der Englischunterricht interessanter zu gestalten wäre").

The prompts for each question were as follows (the German original prompts can be found in the appendix):

- **Challenge:** *You work individually and are free to study very advanced topics (e.g. advanced vocabulary or grammar). When you feel ready, you can attempt a test to see if you have mastered the topic.*
  This gamification strategy was adapted from Shi and Cristea, who suggest a "customizable learning context that can be adjusted by students themselves" (Shi & Cristea 2016: 296). Likewise, Doney suggests letting students choose their own difficulty level (Doney 2019: 8).
- **Feedback:** *You do a digital test on a computer. You immediately receive your test score.*
  Shi and Cristea emphasize the importance of "clear, immediate and positive feedback for learning activities, to fulfill the need for Autonomy and Competence" (Shi & Cristea 2016: 297). The survey only attended to clear and immediate feedback without the 'positive' aspect, in order to make the prompt clearer. If the participants were told that the digital test featured a congratulating message (see ibid.), the participants willingness to try out the strategy may stem mainly from the encouraging words and not the immediate, clear feedback.
- **Interaction:** *You play an interactive quiz. You and four other students work together as a team and compete against other teams.*

Educational environments are perfect for “team play and competition against others” (Doney 2019: 5), two aspects that motivate students in both school and games.

- **Representation:** *Your tasks have interesting names. Presentations are now ‘quests’, writing papers is called ‘crafting’ and exams are ‘boss fights’. Except for the names, everything stays as usual.*

  As mentioned earlier, I have decided to focus on Doney’s first understanding of ‘Representation’, a fantasy game world in which learning takes place (Doney 2019: 6). The strategy itself was employed by Sheldon (2012: 32), who used the same names as in the prompt.

- **Reflection:** *You regularly speak to your peers about decisions you made during class. Such decisions could be your stance in a discussion, or decisions you made while working on a project.*

  “Providing learners with the opportunity to reflect on their learning and the new knowledge obtained […] can encourage deeper and longer-term learning. This could be incorporated by asking learners to provide reasons for their choices […]” (Doney 2019: 10). Teachers also need to give the students the time they need, refraining from implementing time limits (ibid.).

- **Competition:** *You have a check card that tracks your grades and other academic achievements. You can look into your progress online and compare with other students. You are free to use your own name or a nickname.*

  Doney finds it beneficial to have a system that gives students recognition for their achievements. One must keep in mind, however, that direct competition may be motivating for some students but might inspire anxiety in others, which is why a good compromise could be a voluntary leaderboard (Doney 2019: 8). This survey’s prompt does not mention that the leaderboard would be voluntary because the participants are asked whether they would be willing to participate as it is. The specific idea of achievement-tracking cards comes from Stott and Neustaedter, who witnessed physical check cards that are hooked to an online leaderboards at Rochester Institute of Technology in New York State (Stott & Neustaedter 2013: 4)

- **Control:** *There is no collective reading. Instead, you choose books to read from a list. Afterwards, you do tasks which, again, you choose from a list.*
  Control means that a player can have influence on the game's events (Doney 2019: 4). In school, control would mean that students have active participation in the shaping of their school year. This idea for a reading list with a subsequent task list is my own; I chose it because it is easy to implement in school and because it gives the students as much control as they can have in the current educational system.
- **Progression:** *You do not receive grades. Instead, every test, exam, and homework gives you experience points (XP). The better your work, the more XP you gain, the faster you level up. You must reach a certain level in order to complete the school year.*
  As mentioned before, this category was my own idea. Adding the category "Progression" may be interesting because a feeling of progression can bolster Competence (see chapter 1.2). The idea of an XP-based progression system in school is the center point of Sheldon's gamified classroom (Sheldon 2012: 6). It is also included because I personally believe the strategy to be very motivating as it eliminates the student's anxiety diminishing their grade, because they are put into a mindset of collecting from the beginning of the year. Therefore, I expect that popularity of this strategy will be rather high.

After completing all eight questions, the participants were asked for statistical information regarding themselves. Specifically, they were asked about:

- Age
- Gender
- Whether they enjoy playing video games[11]
- Which type of school they attend
- How much they enjoy the subject English
- What their last final grade in English was

[11]For this questions, optional answers were 'Yes', 'No', and 'Yes, but only mobile games'. The third option was included to capture all video game enthusiasts, even those who may not consider themselves 'real gamers' because they only play mobile games.

The purpose of these questions was to allow drawing connections between the participants' willingness to try out gamification strategies and their enthusiasm for English or video games.

4.3 Participants

The target audience for this study were adolescents aged 14 to 16. This specific age group was chosen in order to gain an insight into the opinions of the oldest possible students who are still within compulsory education. It was important to question students within compulsory education to ensure that students from many different school types could participate in the survey.

The link to the online survey was sent out in an e-mail to the head teachers of seven schools in Vorarlberg, Austria, with the request to forward the link to teachers who may fill out the questionnaire with their students. Vorarlberg was chosen as a location to minimize the covered area, making the results representative of a confined region. The schools receiving the survey were

- 3 upper secondary schools/AHS (BRG Schoren, BORG Egg, BORG Lauterach)
- 3 technical upper secondary schools/BHS (HTL Bregenz, HTL Dornbirn)
- 2 pre-vocational schools (FW Dornbirn, Polytechnische Schule Dornbirn)

4.4 Results

The survey was active between November 5th and November 17th, 2019. During this time period, the survey achieved a total of 509 clicks, which includes erroneous clicks such as double clicks. The number of participants who answered at least one question is 209. The number of participants who finished the questionnaire is 196. Of these 196 participants, many failed to answer some questions, resulting in 124 participants who completed the questionnaire in its entirety. Only the data of these 124 participants will be considered.

4.4.1 Results - participants

Of the 124 participants who completed the questionnaire, 24 (19.4%) indicated to be 14 years old, 31 (25%) indicated to be 15, 6 (4.8%) indicated to be 16, and 63 (50.8%) indicated to be 17 or older. Because the target group for this survey was

14-to-16-year-olds, the ’17 and older’-category was included only as a contingency measure to accommodate possible older students. Their answers were initially intended to be disregarded. However, since more than half of the participants were in fact 17 or older, their answers will be included in the data analysis like the data of all other age groups.

Alter		Häufigkeit	Prozent
Gültig	14	24	19.4
	15	31	25.0
	16	6	4.8
	17 und älter	63	50.8
	Gesamt	124	100

Table 1: Age distribution among participants

Regarding gender, 73 participants (58.9%) indicated to be male, 49 (39.5%) indicated to be female and 2 (1.6%) indicated to identify with a different gender.

Regarding school type, 59 participants (47.6%) indicated to attend a technical upper secondary school (BHS), 56 (45.2%) indicated to be students at a polytechnical school, 3 (2.4%) attend a regular lower or upper secondary school (AHS/BORG), and 6 (4.8%) indicated to attend a different school type than these. The questionnaire only had ‘AHS/BORG’, ‘BHS’, ‘Polytechnische Schule’, and ‘Andere Schule’ as options, which means that the 6 participants with a different school type are most likely students at FW Dornbirn, a pre-vocational school type that was not an explicit option to choose in the questionnaire. Consequently, there is an even split between participants who attend a school with Matura (62 participants, 50%), and participants who attend a school without Matura (62 participants, 50%).

Regarding video games, 72 (58.1%) participants said they enjoyed playing video games, 17 (13.7%) enjoy only mobile games, and 35 (28.2%) indicated not to enjoy playing video games. Accumulating all video game enthusiasts, both computer/console and mobile gamers, means that 89 (71.8%) participants play video games. All video game enthusiasts were intended to be captured because gamification strategies can be found in both computer/console games and mobile games, meaning that all gamers are likely to encounter them while playing.

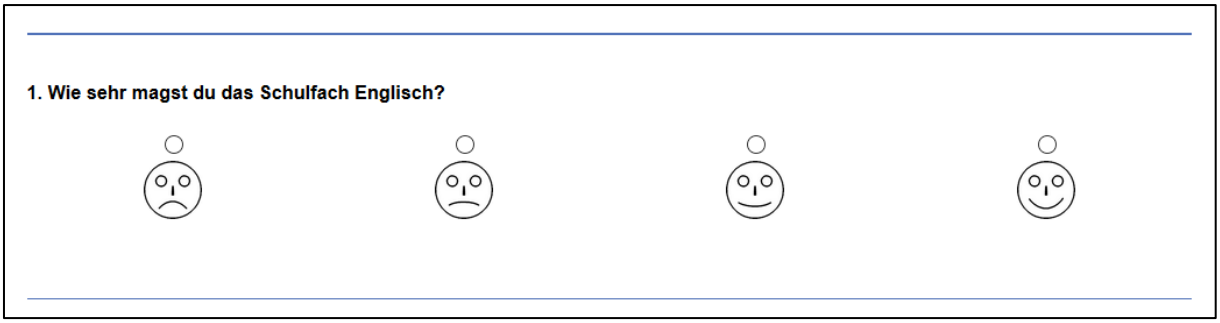

Fig. 5: Question regarding affinity for English as a subject. From left to right: Very irritated, mildly irritated, mildly pleased, very pleased.

Regarding English as a school subject, participants were asked to indicate their affinity for the subject by means of smileys. There were four options: Very irritated, mildly irritated, mildly pleased, and very pleased. The depiction of the smileys can be seen in Figure 5.

Out of 124 participants, 8 (6.5%) indicated to be very irritated by English, 9 (7.3%) indicated to be mildly irritated, 60 (48.4%) indicated to be mildly pleased, and 47 (37.9%) indicated to be very pleased. Overall, participants have the tendency to enjoy English class.

Regarding the most recent final grade in English, 23 (18.5%) received a 'Sehr Gut', 36 (29%) received a 'Gut', 40 (32.3%) received a 'Befriedigend', 15 (12.1%) received a 'Genügend', 1 (0.8%) received a 'Nicht Genügend' and 9 (7.3%) preferred not to specify.

4.4.2 Results – gamification strategies

The following sections aim to display the results of the survey. The detailed results can be found in the appendix.

4.4.2.1 Challenge

The first question asked participants about a gamification strategy according to which students could pick their own difficulty level and attempt a test only when they feel ready. This strategy represents "Challenge", a notion by Doney, who says that it is beneficial for students to pick their own difficulty level (Doney 2019: 8).

Of 124 questioned participants, 66 (53.2%) stated that they had already experienced this or a similar strategy in school. 54 (43.5%) stated to have liked the

strategy and 12 (9.7%) had not liked it. 58 (46.8%) participants had never experienced anything like this strategy in school.

The participants were seemingly interested in this gamification strategy, as 65 (52.4%) stated to be willing and 21 (16.9%) stated to be very willing to try it. Almost 70% of participants were therefore well-disposed toward the strategy. In contrast, 38 (30.6%) participants indicated that they were not willing or not at all willing to try it.

Regarding their estimation whether the strategy would work in the classroom, participants showed to be even more optimistic. 75 (60.5%) participants agreed and another 20 (16.1%) fully agreed that the strategy would work. Conversely, only 29 (23.4%) participants disagreed or fully disagreed that the strategy would work.

4.4.2.2 Feedback

The second question addressed a gamification strategy according to which students do tests on a computer and immediately receive their results. It is representative of the “Feedback”-category, which emphasizes the importance of clear, immediate, and ideally positive feedback (Shi & Cristea 2016: 297).

Of 124 questioned participants, 75 (60.5%) stated that they had already experienced this or a similar strategy in school. 66 (53.2%) stated to have liked the strategy and 9 (7.3%) had not liked it. 49 (39.5%) participants had never experienced anything like this strategy in school.

This gamification strategy seems popular, as 40 (32.3%) stated to be willing and 64 (51.6%) stated to be very willing to try this gamification strategy, which is more than half of all participants. Therefore, 104 (83.9%) participants were well-disposed toward the strategy. In contrast, 20 (16.1%) were not willing or not at all willing to try it.

The participants’ opinions on whether the strategy would work in the classroom were in agreement to their opinions from the previous paragraph . 49 (39.5%) participants agreed and another 56 (45.2%) fully agreed that this strategy would work in class. 19 (15.3%) disagreed or fully disagreed that the strategy would work.

4.4.2.3 Interaction

The third question asked participants about a strategy according to which students are sorted into teams to compete against each other while participating in a quiz, which is a popular strategy among teachers already. It represents both forms of 'Interaction', which are team play and competitiveness (Doney 2019: 5).

Of 124 participants, 93 (75%) stated to have experienced this or a similar strategy in class already. Of these 93 participants, 83 (66.9%) stated to have liked it while 10 (8.1%) had not liked it. 31 (25%) had never experienced anything like this strategy in school.

This is another popular gamification strategy, as 44 (35.5%) participants were willing and another 63 (50.8%) were very willing to try this strategy in school. Like the previous strategy, more than half of all participants were very willing to try it. 17 (13.7%) were not willing or not at all willing to try it.

47 (37.9%) participants agreed and another 54 (43.5%) fully agreed that the strategy would be realizable in class. 23 (18.5%) disagreed or fully disagreed.

4.4.2.4 Representation

In the fourth question, the participants were asked about a gamification strategy that renames presentations, papers, and exams to 'quests', 'crafting', and 'boss fights', respectively. It is representative of Doney's understanding of representation, according to which learners may be more motivated if learning takes place in a fictional fantasy setting (Doney 2019: 6).

This strategy was unfamiliar to most participants. Of 124 participants, 16 (12.9%) indicated to have experienced this or a similar strategy. 7 (5.6%) participants stated to have liked the strategy while 9 (7.3%) stated to have disliked it. 108 (87.1%) have never experienced anything like this gamification strategy.

The strategy was also less popular than previous ones. 29 (23.4%) participants stated to be willing and another 18 (14.5%) stated to be very willing to try the strategy. Contrarily, 42 (33.9%) participants were not willing and an additional 35 (28.2%) were not at all willing to try this gamification strategy in school.

Participants were balanced when it comes to their estimation of the strategy's practicability in school. While 64 (51.6%) participants disagreed or fully disagreed that this strategy would work in class, 60 (48.4%) agreed or fully agreed.

4.4.2.5 Reflection

The fifth question dealt with giving students the opportunity to reflect on their choices, which deepens their understanding of actions and consequences (Doney 2019: 10). Since the strategy describes simple reflection, it can be presumed that many teachers employ this strategy already.

Surprisingly, participants were quite balanced when it comes to how familiar they were with the strategy. Of 124 participants, 61 (49.2%) stated to have experienced this strategy in school already. 50 participants (40.3%) had enjoyed it while 11 participants (8.9%) had not. 63 (50.8%) participants had never experienced anything like this strategy in school.

61 (49.2%) participants stated that they were willing to try this strategy in class and another 18 (14.5%) stated to be very willing to do so. 45 (36.3%) were not willing or not at all willing to try the strategy, with more participants leaning towards 'not willing'.

Participants proved confident in the practicability of this strategy. 73 (58.9%) participants agreed and another 17 (13.7%) fully agreed that the strategy would work in class. 34 (27.4%) disagreed or fully disagreed.

4.4.2.6 Competition

The sixth question asked participants about a physical card on which students' grades and other academic achievements are stored. Competition is made possible by means of an online hub where students can see and compare their progress.

Of 124 participants, 24 (19.4%) stated that they had previously experienced this or something similar. 18 (14.5%) participants had liked the strategy while 6 (4.8%) had disliked it. 100 (80.6%) participants had never experienced anything like this strategy.

The strategy proved popular. 46 (37.1%) participants indicated to be willing and another 47 (37.9%) indicated to be very willing to try this gamification strategy in

school. In contrast, 31 (25%) were not willing or not at all willing to try this strategy. Three quarters of the participants were therefore well-disposed towards this gamification strategy.

The participants' estimation on the strategy's practicability was optimistic as well. 93 (75%) participants agreed or fully agreed that the strategy would work well, while 31 (25%) disagreed or fully disagreed. All participants tended marginally toward the less positive options. Still, 75% of all participants were confident that the strategy would work well in a school context.

4.4.2.7 Control

The seventh question dealt with letting students choose their own literature to read and subsequently letting them have a say about what tasks they would like to do in association to the literature. This strategy represents the category of 'Control' because it allows students to have influence on their own learning (Doney 2019: 4).

Of 124 participants, 48 (38.7%) stated to have previously experienced something similar in school. Of these, 30 (24.2%) said to have liked the strategy, whereas 18 (14.5%) had not liked it. 76 (61.3%) participants had never experienced anything like this at school.

46 (37.1%) participants indicated to be willing and another 33 (26.6%) indicated to be very willing to try this strategy in school. 33 (26.6%) were not willing and 12 (9.7%) were not at all willing to try it.

Participants were mostly confident that this strategy could work in the classroom. 51 (41.1%) agreed and another 30 (24.2%) fully agreed that the strategy is practical. 43 (25.8%) either disagreed or fully disagreed that this is a good strategy to employ at school.

4.4.2.8 Progression

In the eighth question, participants were questioned about an additional gamification category that is not featured in Doney's list. I added it to inquire about the popularity of Sheldon's XP system (Sheldon 2012: 31), which I regard as a very motivating strategy.

As expected, the strategy is not well-known. 22 (17.7%) participants stated to have encountered this strategy at school, already. Among these 22, opinions were evenly split; 11 (8.9%) participants did not enjoy the strategy, whereas 11 (8.9%) did enjoy it. 102 (82.3%) participants had never experienced anything like this in school.

Interestingly, the strategy enjoys less popularity than expected. While 30 (24.2%) indicated to be willing and another 35 (28.2%) indicated to be very willing to try the strategy in school, 26 (21%) were not willing and another 33 (26.6%) even were not at all willing to try this strategy. The strategy's popularity can be considered controversial, as the participants' opinions were spread roughly equally across the four possible answers.

Similar is the participants estimation of the strategy's practicability. 41 (33.1%) agreed and another 29 (23.4%) fully agreed that this gamification strategy would be practical to be employed in school. Conversely, 24 (19.4%) disagreed and 30 (24.2%) fully disagreed that the strategy would be a practical choice.

4.4.3 Most common gamification strategies

The most commonly used gamification strategies are 'Interaction', which 75% of participants have already experienced, 'Feedback' with 60.5%, and 'Challenge' with 53.3%. The most seldomly used strategies are 'Competition' with 19.4%, 'Progression' with 17.7%, and 'Representation' with 12.9%.

The most common strategies according to school type can be seen in table 2. Students attending an upper secondary school (AHS) are omitted because of their small sample size.

Gamification Strategy	General	Polytec.	BHS	Other
Challenge	53.2%	58.9%	47.5%	33.3%
Feedback	60.5%	58.9%	61%	50%
Interaction	75%	82.1%	67.8%	66.7%
Representation	12.9%	19.6%	8.5%	0%
Reflection	49.2%	58.9%	40.7%	16.7%
Competition	19.4%	33.9%	8.5%	0%
Control	38.7%	60.7%	22%	16.7%
Progression	17.7%	28.6%	10.2%	0%

Table 2: Most common gamification strategies according to school type ("How many students of each type have experienced each strategy already?")

4.4.4 Most popular gamification strategies

To achieve a ranking of the most popular gamification strategies among all participants, their answers to the 'I would like to try this (again) in school'-part of each question were considered. Participants could give four possible answers: 'Fully disagree', 'disagree', 'agree', and 'fully agree'. Each of these four possible answers was assigned a numerical value; 'fully disagree' was assigned 1, 'disagree' was assigned 2, 'agree' was assigned 3, and 'fully agree' was assigned 4. All participants therefore submitted a value between 1 and 4 on the 'I would like to try this (again) in school'-part of each question. Of all submitted values, the mean value was calculated and then ranked to determine the most popular gamification strategy on average among all participants. The ranking can be seen in table 3.

Gamification Strategy	Mean Value	Mean Deviance
Feedback	3.31	0.840
Interaction	3.30	0.883
Competition	3.01	1.000
Control	2.81	0.943
Challenge	2.76	0.859
Reflection	2.68	0.851
Progression	2.54	1.165
Representation	2.24	1.023

Table 3: Most popular gamification strategies

On average, the most popular gamification strategy is the gamification strategy proposed under the heading 'Feedback', which consists of students doing tests on computers and getting immediate feedback afterwards. A mean value of 3.31 means that the average participant submitted a value about a third of the way between 'agree' and 'fully agree'. Additionally, 'Feedback' has the lowest mean deviation, meaning that participants' opinion was the most uniform regarding this strategy. However, 'Feedback' is head-to-head with 'Interaction' The corresponding strategy consisted of students working in teams against other teams to take first place in a quiz. Here, the mean value is 3.30, which is only marginally smaller than the mean value of 'Feedback'. 'Interaction' also has a relatively small mean deviance. The two strategies corresponding with 'Feedback' and 'Interaction' are therefore the ones where a teacher, if they adapted them, may assume their students to be the most cooperative.

There may be differences in preference of gamification strategies in relation to age, gender, school types etc., which shall be outlined in the following sections.

4.4.4.1 Polytechnical schools

Gamification Strategy	Mean Value	Mean Deviance
Interaction	3.29	0.868
Feedback	3.05	0.961
Competition	3.04	0.914
Control	2.84	0.949
Progression	2.79	1.187
Challenge	2.71	0.889
Reflection	2.62	0.906
Representation	2.48	1.009

Table 4: Most popular gamification theories – polytechnical schools

The preferences of students at Polytechnical schools largely resemble the preferences indicated by all participants. 'Interaction' is the most popular category, with almost the same mean value as in the overall ranking. 'Feedback' is slightly less popular and almost tied with 'Competition'. 'Progression' is slightly more popular than among all participants, but it also has by far the largest mean deviance, meaning that opinions on this category are rather polarized among students at a polytechnical school. Surprisingly 'Progression' is also a lot more popular among this school type than among other school types.

4.4.4.2 Technical upper secondary schools (BHS)

Gamification Strategy	Mean Value	Mean Deviance
Feedback	3.51	0.679
Interaction	3.31	0.895
Competition	3.03	1.098
Challenge	2.83	0.854
Control	2.75	0.921
Reflection	2.66	0.843
Progression	2.37	1.128
Representation	2.00	1.000

Table 5: Most popular gamification strategies – technical upper secondary schools

Concerning the preferences of students at technical upper secondary schools, it is striking that 'Feedback' is especially popular and has the lowest mean deviance, meaning that it is the most consistently liked in this group. Furthermore, 'Representation' is even less popular than among other groups. The strategy with the highest mean deviance is again 'Progression'.

4.4.4.3 Other school types

Gamification Strategy	Mean Value	Mean Deviance
Feedback	3,67	0.516
Interaction	3,17	1.169
Reflection	3,17	0.408
Control	3,00	1.265
Competition	2,67	0.516
Representation	2,67	1.033
Challenge	2,50	0.837
Progression	2,17	0.753

Table 6: Most popular gamification strategies – other schools

Students at 'other' school types are assumed to be students at FW Dornbirn because this school was the only school receiving the questionnaire without being explicitly represented in the questionnaire's 'statistical information'-part. These participants are therefore assumed to be students at a school focused on pre-vocational training, similar to the polytechnical school type. Although only 6 participants indicated to be students of an 'other' school type, their results shall be examined.

'Feedback' is the most popular gamification strategy and also one of the two least controversial ones, according to mean deviance. 'Progression' is the least popular strategy, albeit far less controversial than in other school types. Interestingly, 'Interaction' and 'Control' are the most controversial strategies, clashing with the other groups, where these two strategies did not exhibit a particularly high mean deviance. It may be possible that the mean deviance of 'Interaction' is so high because the competitive nature of the gamification strategy was off-putting to some participants, seeing as 'Competition' is not ranked as highly. 'Representation' has a similar mean deviance as in other groups, further supporting the idea that proponents of the strategy can be found in all school types.

4.4.4.4 Upper secondary schools (AHS/BORG)

Of this school type, only 3 participants answered all questions in the questionnaire. The sample size is too small to be representative. A discussion of the results shall therefore be omitted.

4.4.4.5 Gender

Among female participants of all school types, 'Interaction' and 'Feedback' were the most popular gamification strategies. 'Progression' and 'Representation' were

the least popular strategies. The most controversial were ‘Progression’ and ‘Competition’.

Among male participants, the results were similar. ‘Interaction’ and ‘Feedback’ were the most popular gamification strategies and ‘Progression’ and ‘Representation’ were the least popular ones.

Overall, there are no significant differences between the preferences of female versus male participants. Tables with the detailed results can be found in the appendix.

There were 2 participants who identify as neither female nor male. Because of the small sample size and because they will not be assigned to another gender, a discussion of their results shall be omitted.

4.4.4.6 Affinity for video games

Figure 6 shows how popular each gamification strategy is with three different groups of participants: Those who stated to like video games (also referred to as computer/console gamers), those who stated to like mobile games only, and those who stated to not like video games, at all.

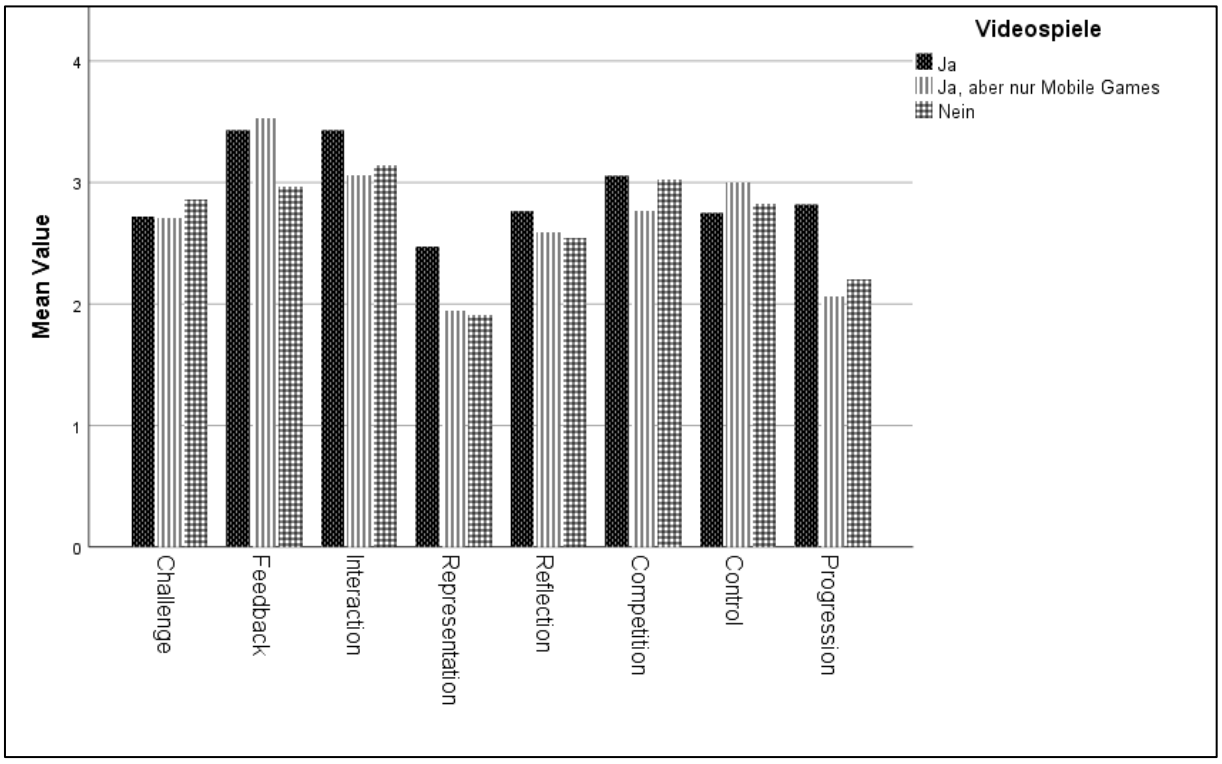

Fig. 6: Popularity of gamification strategies according to affinity for video games

The groups have mostly similar preferences among gamification strategies and the overall results largely resemble the results of the examinations in previous sections. ‘Feedback’ and ‘Interaction’ are the most popular gamification strategies among all groups, whereas ‘Progression’ and ‘Representation’ are the least popular strategies. It is salient that gamers, both computer/console and mobile gamers, tended to give all gamification strategies higher ratings than non-gamers. Also interesting is that the two least popular strategies, ‘Progression’ and ‘Representation’ are significantly more popular among computer/console gamers than among mobile gamers and non-gamers.

Two strategies are slightly more popular among non-gamers than among computer/console gamers: ‘Challenge’ and ‘Control’. Interestingly, ‘Challenge’ and ‘Control’ are the strategies that are archetypical for the concept of ‘Autonomy’, as both strategies require students to choose their own exercises. One could infer that Autonomy-proposing strategies are more appealing towards non-gamers because gamers are used to rely on instructions, but the differences are too small to draw meaningful conclusions.

4.4.4.7 Affinity for English as a subject

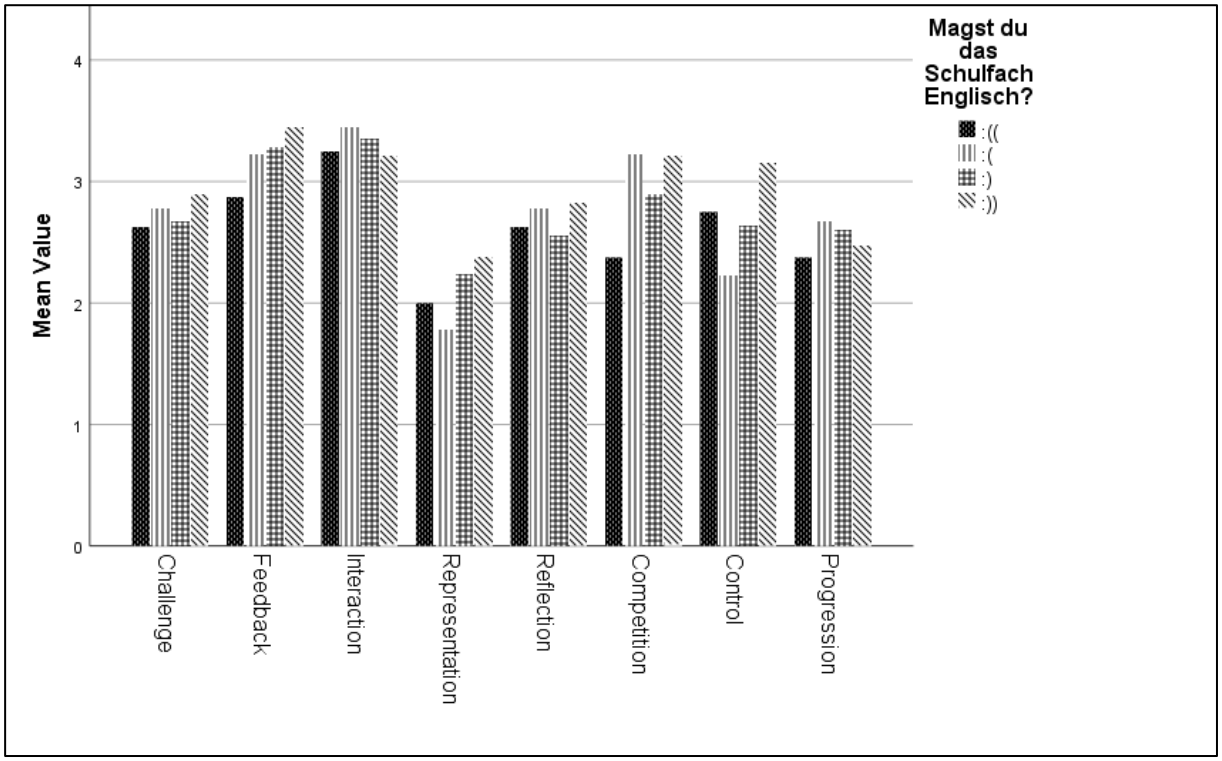

Fig. 7: Popularity of gamification strategies according to affinity for English as a subject

Considering Figure 7, there are two salient observations to make. First, very enthusiastic participants seemingly liked the ‘Control’-strategy a lot better than other participants, meaning that providing lists for students to choose their own literature and tasks may be especially beneficial for students who take voluntary advanced English classes.

Secondly, very unenthusiastic participants liked the ‘Competition’-strategy considerably less than other participants, stressing the importance of implementing it on a voluntary basis should it ever be implemented.

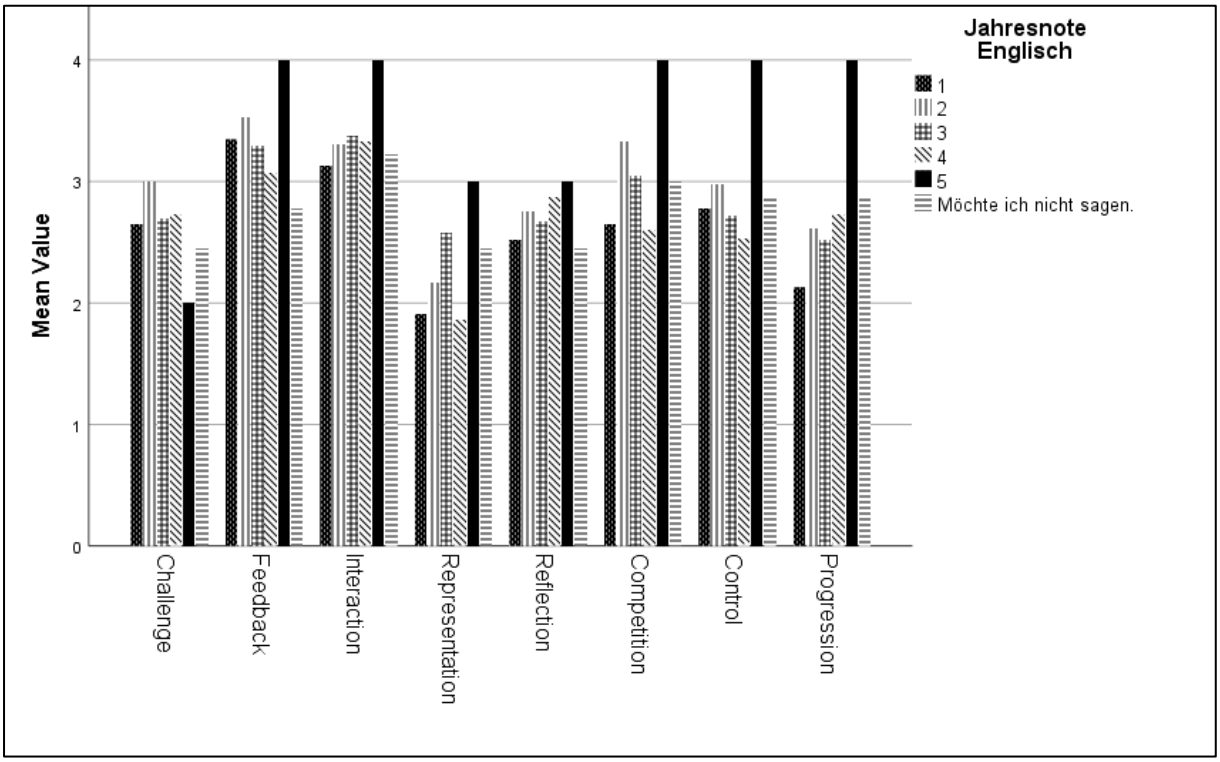

Fig. 8: Popularity of gamification strategies according to most recent final grade in English

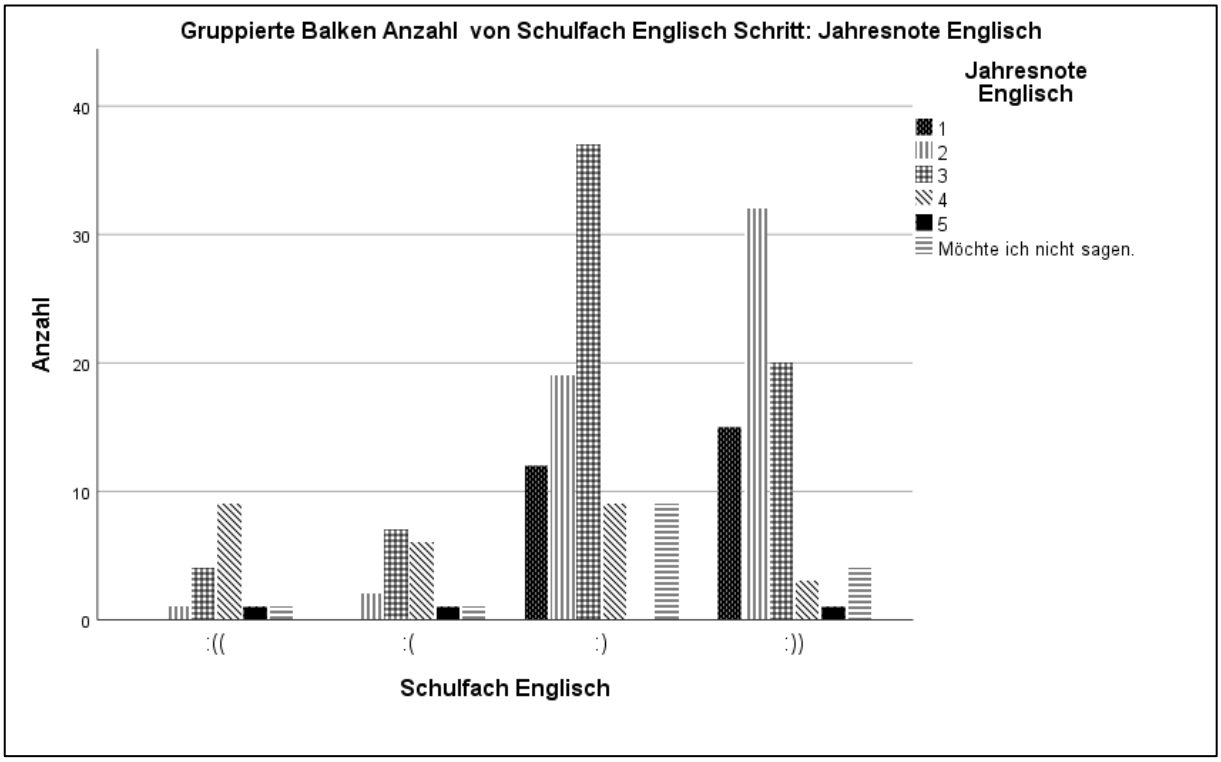

Fig. 9: Relation between affinity to English and most recent final grade

For Figure 8, there is one thing to note: The purely black bar showcasing the preferences of participants whose most recent final grade was a ‘Nicht Genügend’ (i.e. ‘5’) is misleading because this group only counts one participant. This bar should therefore be disregarded. Other than that, the figure noticeably resembles Figure 7, again showing that the ‘Competition’-strategy tends to be considered more practical among good students, who are also the more enthusiastic (as seen in Figure 9).

4.4.4.8 Age

As mentioned in section 4.4.1, more than half of all participants were 17 or older. Therefore, the results in respect to age shall be discussed by means of two groups: participants younger than 17 and participants 17 or older.

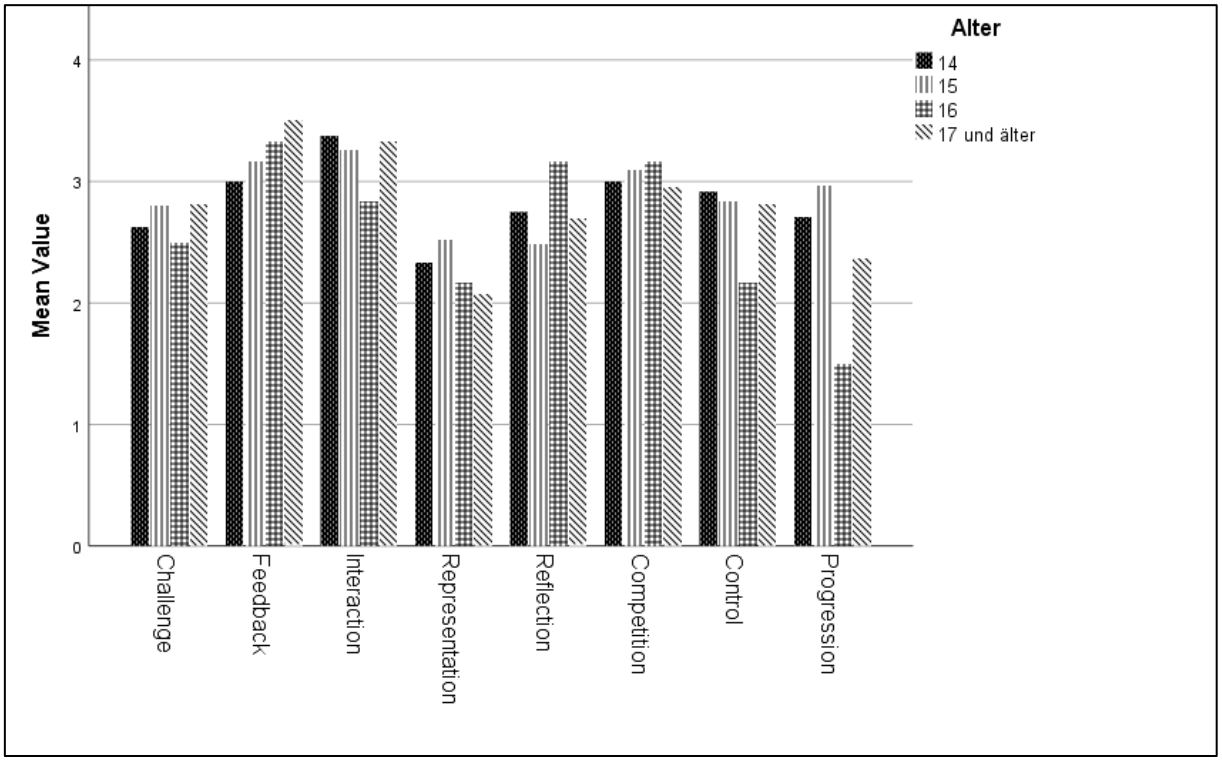

Fig. 10: Popularity of gamification strategies according to age

Among participants younger than 17, ‘Interaction’, ‘Feedback’, and ‘Competition’ were unsurprisingly the most popular, underlining the importance of Relatedness in the classroom. The least popular gamification strategies were ‘Representation’ and ‘Reflection’. Interestingly, ‘Progression’ is located mid-table, having obtained even higher ratings than ‘Challenge’ (among younger students), even though ‘Progression’ was among the lowest rated gamification strategies in most of the

above analyses. Still, ‘Progression’ and ‘Representation’ were the most controversial strategies, similar to the results mentioned above.

Among participants 17 or older, ‘Feedback’ and ‘Interaction’ were the most popular gamification strategies while ‘Representation’ and ‘Progression’ were the least popular. In this age group, it is salient that there is a wide margin between the most and least popular gamification strategies, with a difference in mean value of 1.43 between the most and least popular. There are also more controversial strategies, with ‘Representation’, ‘Progression’, and ‘Competition’ having a standard deviance of over 1.0. In total, participants who are 17 or older seem to have much more polarized opinions than their younger peers.

The exact numbers can be found in the appendix. Figure 10 shows each age group’s preferences with more detail.

4.4.5 Most practical gamification strategies

The most practical gamification strategies describe the gamification strategies that participants believed would work the best in an actual classroom. To achieve a ranking, the same approach as to determine the most popular gamification strategies was used: For each question, the participants’ opinions on whether the strategy would work well in class was considered. The participants could, again, give four answers: ‘Fully disagree’, ‘disagree’, ‘agree’, and ‘fully agree’. Each of these numbers was, again, assigned a numerical value from 1-4, after which the mean value of every gamification strategy was calculated. The ranking of these mean values can be seen in table 7.

Gamification Strategy	Mean Value	Mean Deviance
Feedback	3,26	0.815
Interaction	3,21	0.839
Competition	2,98	1.016
Challenge	2,83	0.814
Control	2,81	0.908
Reflection	2,77	0.795
Progression	2,56	1.099
Representation	2,40	1.011

Table 7: Most practical gamification strategies

The ranking is almost exactly the same as with the most popular gamification strategies, safe for ‘Challenge’ and ‘Control’, which switched places. Other than that, ‘Feedback’ and ‘Interaction’ are, to the participants’ minds, the most practical gamification strategies to employ in the classroom. ‘Progression’ and ‘Representation’ are the least practical gamification

strategies. However, together with ‘Competition’, they have the highest mean deviance, meaning that participants’ opinion diverged sharply regarding these strategies.

Since ‘Feedback’ and ‘Interaction’ are considered to be both the most popular and the most practical gamification strategies, these strategies are good contestants for teachers to incorporate in their teaching.

4.4.5.1 Polytechnical schools

Considering table 8, it becomes apparent that students at polytechnical schools have faith in competitive gamification strategies. The two strategies featuring competitive elements, which are ‘Interaction’ and ‘Competition’, have the highest mean value. In addition, ‘Competition’ is more practical than popular. ‘Progression’ seems surprisingly practical to students at polytechnical schools, considering that it is one of the least practical among other school types. Additionally, ‘Progression’ has the highest mean deviance among all gamification strategies for this school type, meaning many students find it very practical while many others do not.

Gamification Strategy	Mean Value	Mean Deviance
Interaction	3,21	0.889
Competition	3,14	0.923
Feedback	3,02	0.963
Challenge	2,91	0.837
Progression	2,86	1.135
Control	2,84	0.910
Reflection	2,82	0.837
Representation	2,61	0.985

Table 8: Most practical gamification strategies – polytechnical schools

4.4.5.2 Technical upper secondary schools (BHS)

Among students at technical upper secondary schools, ‘Feedback’ is considered the most practical gamification strategy by far, followed by ‘Interaction’, which still has a considerably higher score than the next item, ‘Competition’. ‘Progression’ and ‘Representation’ are considered the least practical strategies, while also being among the more controversial ones, meaning that some technical upper secondary students may indeed be confident in these strategies. The most controversial gamification strategy is, interestingly, ‘Competition’, which means that many participants have reservations about the applicability of this strategy in school.

Therefore, it needs to be emphasized again that, should this strategy ever be employed in a school, it must be on an absolutely voluntary basis.

Gamification Strategy	Mean Value	Mean Deviance
Feedback	3,47	0.626
Interaction	3,19	0.776
Competition	2,86	1.106
Challenge	2,80	0.761
Control	2,78	0.892
Reflection	2,69	0.815
Progression	2,36	1.013
Representation	2,22	1.035

Table 9: Most practical gamification theories – technical upper secondary schools

4.4.5.3 Other school types

Despite their small number, participants attending an 'other' school type shall be analyzed. They are assumed to be students at FW Dornbirn, as previously mentioned.

'Feedback' and 'Interaction' are considered the most practical gamification strategies among students of this school type, whereas 'Representation' and 'Progression' are considered the least practical ones. 'Progression' has an uncharacteristically low mean deviance, meaning that these participants were much more compliant with each other than other groups. Instead, the strategies with the highest mean deviance are 'Interaction' and 'Control'. This seems interesting because the 'Interaction'-strategy, according to which students form teams and compete against other teams, is assumed to be commonplace in schools. Possibly, there are some participants who have experienced the strategy first-hand and do not deem it practical. The 'Control'-strategy is interesting because, next to a high

Gamification Strategy	Mean Value	Mean Deviance
Feedback	3,50	0.548
Interaction	3,17	1.169
Reflection	3,00	0.632
Control	2,83	1.169
Competition	2,67	0.516
Challenge	2,67	1.033
Representation	2,33	1.033
Progression	2,17	0.983

Table 10: Most practical gamification strategies – other schools

deviance in this group, it also has a relatively low score among all groups, considering that it does nothing but give the students more control over their workload. Generally, mean deviance is rather high among students at other school types, which could, however, be traced back to the relatively small sample size.

4.4.5.4 Upper secondary schools (AHS/BORG)

As mentioned previously, the sample size of this school type is too small to yield representative results. Thus, a discussion thereof shall be omitted.

4.4.5.5 Gender

Among female participants, ‘Feedback’ and ‘Interaction’ were considered the most practical gamification strategies, whereas ‘Representation’ and ‘Progression’ were considered the least practical. The most controversial are ‘Progression’ and ‘Competition’.

The male participants’ results resemble the female participants’: ‘Feedback’ and ‘Interaction’ were considered the most practical and ‘Progression’ and ‘Representation’ the least practical gamification strategies. However, a difference can be found in that the most controversial were ‘Representation’ and ‘Progression’, although ‘Competition’ has the third highest mean deviance.

It is noticeable that almost all gamification strategies received higher ratings regarding their practicability from male, rather than from female participants. Male participants therefore seem to have more faith in the proposed strategies. Other than that, the results are largely similar. Tables with the detailed results can be found in the appendix.

Because of the small sample size, the two participants identifying as neither female nor male shall be omitted again.

4.4.5.6 Affinity for video games

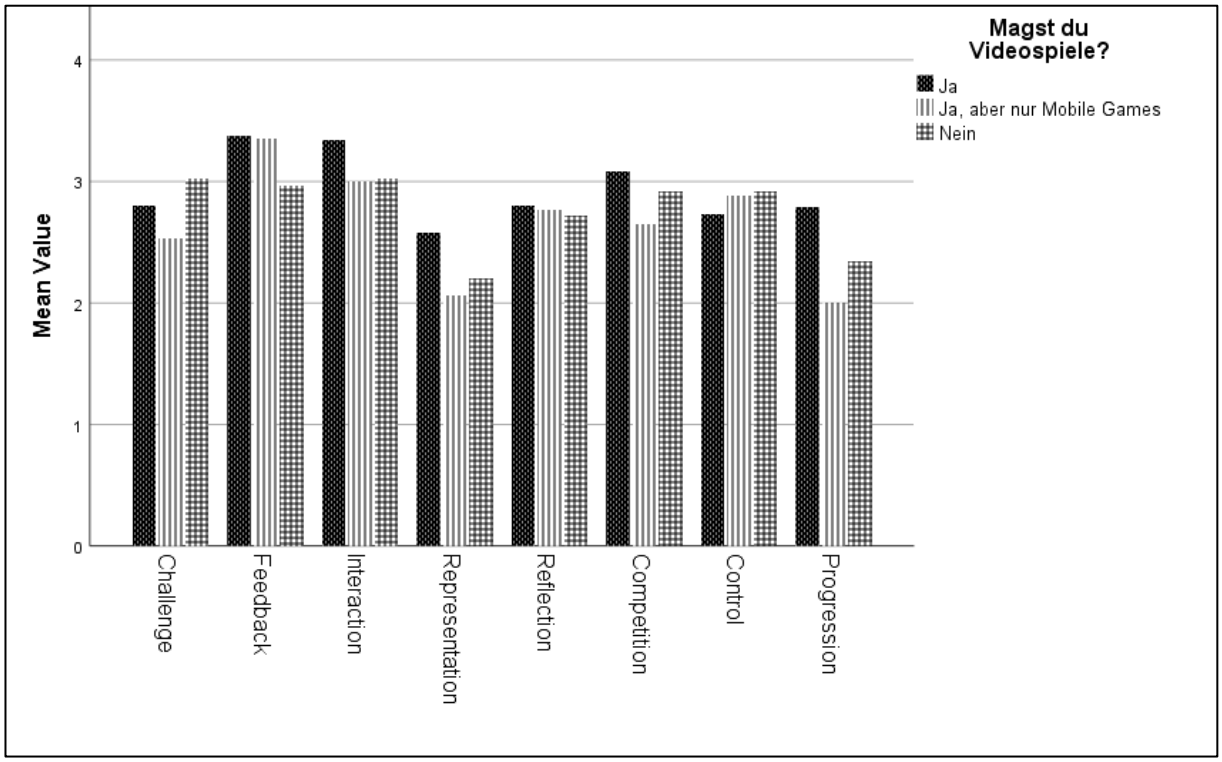

Fig. 11: Practicability of gamification strategies according to affinity for video games

Figure 11 shows the practicality of each gamification strategy in respect to three groups of participants: computer/console gamers, mobile gamers and non-gamers.

Largely, the figure yields similar results as Figure 6, meaning that participants largely agreed on those strategies that are popular to also be fit for implementation in class. One salient difference is that the ‘Challenge’-strategy is considered less practical by mobile gamers than other participants, a result that clashes with the data in Figure 6, in which the strategy was roughly equally popular among all groups.

4.4.5.7 Affinity for English as a subject

Comparing Figure 12 with Figure 7, there are a few noticeable differences. The ‘Challenge’-strategy is considered a lot more practical than it is popular among unenthusiastic and very unenthusiastic students. The ‘Reflection’-category is

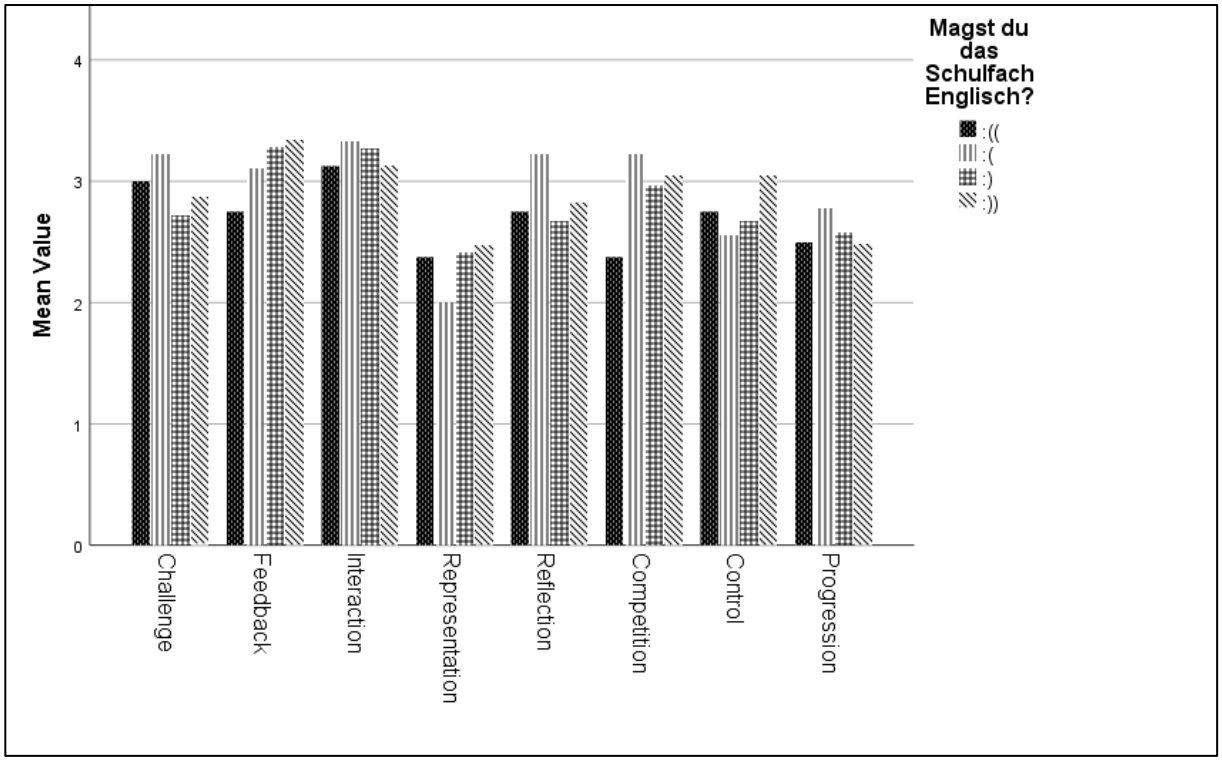

Fig. 12: Practicability of gamification strategies according to affinity for English as a subject

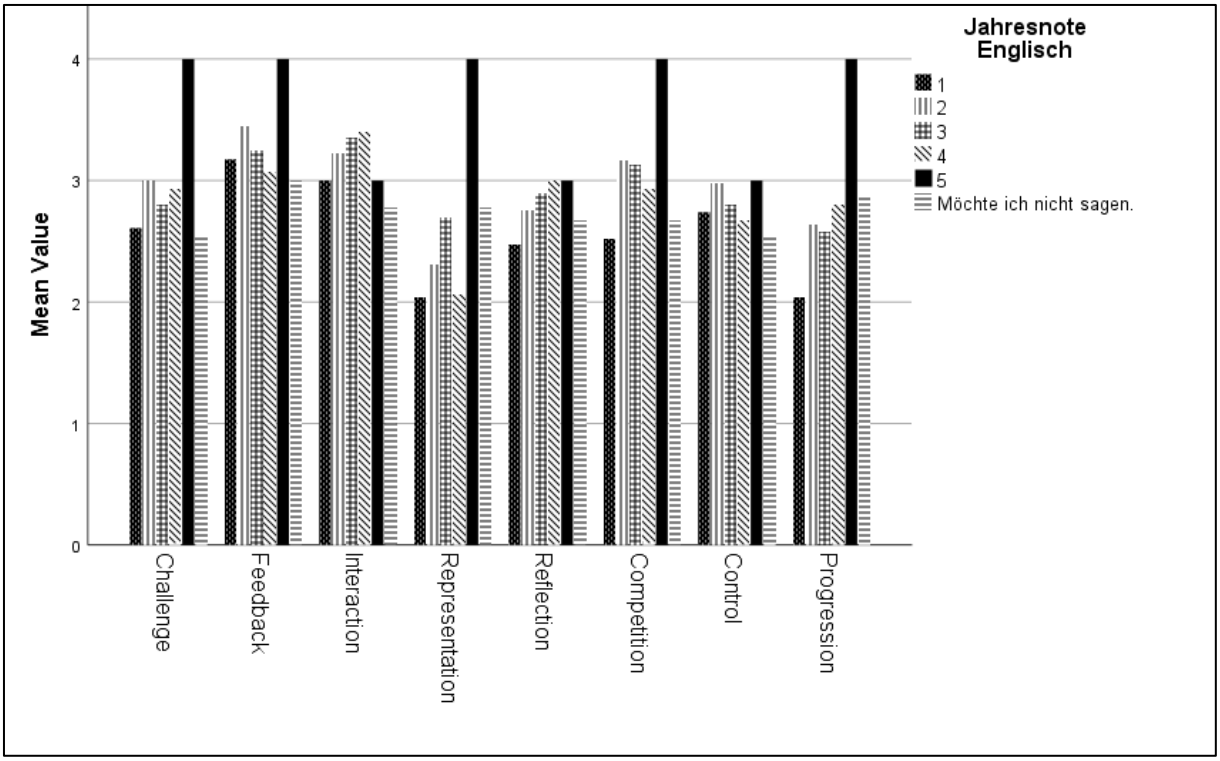

Fig. 13: Practicability of gamification strategies according to most recent final grade in English

deemed much more practical than popular among unenthusiastic students, while value for all other groups are very similar. Additionally, the ‘Control’-strategy is considered more practical than popular by unenthusiastic students.

Again, the black bar in Figure 13, which represents practicability among students with a ‘Nicht Genügend’ (i.e. ‘5’) as their most recent final grade, shall be disregarded since this group only counts one participant. Other than this one participant, the results are very similar to Figure 8.

4.4.5.8 Age

The data shown in Figure 14 resembles that from Figure 10 rather closely. Younger participants apparently have faith in the ‘Progression’-strategy being applicable in the classroom, whereas older students do not.

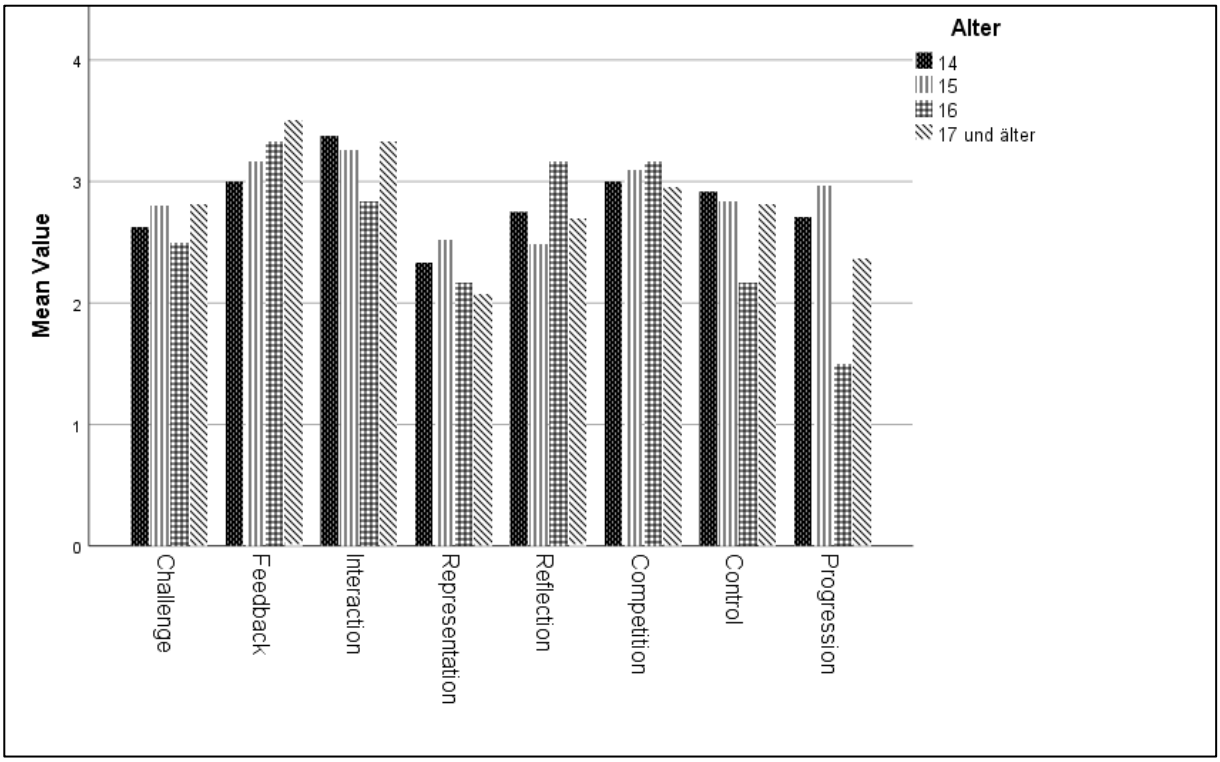

Fig. 14: Practicability of gamification strategies according to age

16-year-olds seem to be particularly fond of the ‘Reflection’-strategy when it comes to both popularity and practicality. Conversely, they seem to be especially uninterested in the ‘Progression’-strategy, again regarding both popularity and practicability.

4.5 Discussion

Surprisingly, as was pointed out in in section 4.4.2.5, more than half of the participants indicated never to have experienced reflection in class, even though Garris et al. agree that learning can only take place if opportunities for both scaffolding and reflection are provided (Garris et al. 2002: 445). Of course, it cannot be assumed that the teachers of more than half of all participants never provide opportunities for reflection in school. Rather, the students may have been thrown off by the wording of the question, according to which they specifically reflect on their decisions. However, the students may think that meaningful decisions are missing from class. Therefore, the fact that more than half have never experienced reflection in school may be indicative of a lack of Autonomy in class, because students feel like there are no autonomous decisions to reflect upon. Wording the question differently may therefore have yielded different results.

Even more surprising is the fact that a large number of those who have indicated to have experienced reflection in school also indicated to have liked it. In contrast, almost half of all participants stated not to be willing to try it. Students may therefore be open towards the idea of reflection in class, but only after they have experienced it at least once.

In section 4.4.3, it is interesting to note that a relatively large number of students at polytechnical schools has already experienced the ‘Representation’-strategy, a strategy that is rarely employed in other school types. Possibly, this strategy is more common than expected among polytechnical schools or lower secondary schools. Contrarily, it is likely that the students have not experienced a renaming of essays, presentations, and exams using fantasy roleplaying terminology, but rather using more generic terms better fitting for an educational working environment. In any case, the renaming of essays, presentations, and exams is still one of the least common strategies.

Another surprisingly common strategy among students at polytechnical schools is the ‘Control’-strategy, which might have been expected to be commonplace at more academic institutions, such as schools where students graduate with a Matura, seeing as it involves large amounts of literature. Still, the data shows that students at polytechnical schools seemingly have experienced lots of of Autonomy,

which is commendable. Overall, students at polytechnical schools seem to be more likely to have encountered each gamification strategy than students at other schools.

In section 4.4.4, the most popular gamification strategies were ranked. ‘Feedback’ was the most popular strategy overall, which makes sense considering that clear and immediate feedback helps satisfy two of the students’ psychological needs, Autonomy and Competence (Shi & Cristea 2016: 296). Competence satisfaction is especially high when the feedback is constructive and pleasant (ibid.). Therefore, despite the fact that ‘pleasant’ feedback was omitted in this study, educators should make sure that their feedback is phrased in as much a positive and constructive way as possible.

Another popular gamification strategy was ‘Competition’, according to which students can track and compare their academic achievements via check cards. This strategy should only be adapted carefully, as it bears similarities to a case mentioned in 3.3, in which a hotel in California installed a digital system that tracked the employees’ performance, ranking them according to diligence. The employees experienced “significant anxiety, embarrassment, and shame” and named the system “the electronic whip” (Kim & Werbach 2016: 166). Some even went so far as to forego bathroom breaks. Students whose grades are openly visible to the rest of the school may experience similar anxiety. If such a strategy is to be employed in a school, it is imperative to make it both on an opt-in-basis and with optional anonymity. It could also be considered to show the students only which place they occupy in the ranking, and keeping the data of all other students completely anonymous.

Conversely, ‘Progression’ and ‘Representation’ were elected the two least popular gamification strategies, meaning that, on average, the participants were least willing to try these in school. Interestingly, both strategies were created by Sheldon, who reports to have been generally successful with them. While some of his students had wished a more structured class, many praised the fresh and creative approach he employed (Sheldon 2012: 45) Here, it must be mentioned that Sheldon modeled his class from the ground up after classic role-playing games, even going so far as to have every student create an avatar character that

they would roleplay as during class (op. cit.: 37). His students encountered the two gamification strategies in a much more integrated manner than in the context of this survey. Additionally, Sheldon taught classes on digital game design, meaning that these strategies may work better with an audience that is interested in game design. The fact that these two strategies exhibit the highest mean deviances in this survey further affirms the idea that they resonate better with specific audiences.

Sheldon's approach and, consequently, the two gamification strategies proposed under 'Progression' and 'Representation' were adapted at a US-High School (Sheldon 2012: 49). There, the 'Progression'-strategy proved to be very popular among students, who stated that they enjoyed the high level of transparency that comes with knowing exactly how many XP are required to receive a grade (op. cit.: 55). Unfortunately, there is no mention of how well the students received the 'Representation'-strategy, but there is mention of a reward system that resonated well with students. The reward system features a wall of fame for exceptionally good assignments, next to a fictional currency named "Biology Bucks" that can be used to purchase stationery or hall passes and can even be used at occasional auctions to bid for prizes such as gift cards. Biology Bucks are handed out to students when they complete assignments. The better the assignment, the more Bucks students will get (op. cit.: 54). Doney (2019) did not include reward systems in her list of gamification categories, which is why no reward system was featured in this survey. If it had been included, a reward system may have proven popular.

Sheldon's 'Progression' and 'Representation'-strategies worked well with his own and other students, as opposed to this survey, where participants deemed them the least desirable of all. This might be explained by the assumption that students are accepting of these strategies once they experience them first-hand or at least understand them to full extent. In any case, this survey found that they are not popular at all, which clashes with the results found by Sheldon.

In section 4.4.4.6, it has already been briefly mentioned that the 'Representation' and 'Progression'-strategies enjoy significantly higher popularity among computer/console gamers than among mobile gamers or non-gamers. This is interesting because, as mentioned above, these strategies have their origin with

Sheldon (2012) and are inspired by classic roleplaying games. A reason for the greater popularity of these strategies among computer/console gamers may be that gamers are already familiar with these concepts and employing them in school would mean introducing terminology that they are familiar with and passionate about. Especially the 'Progression'-strategy' is salient because it was similarly popular as other strategies among computer/console gamers, such as 'Challenge', 'Reflection', and 'Control'. However, among mobile gamers, the same strategy proved even less popular than among non-gamers. The strategy may therefore be viable for the specific group of computer/console gamers. Since Sheldon taught a class on digital game design, he may have found the ideal playground for employing the 'Progression'-strategy.

Unfortunately, Sheldon features no accounts on the popularity of the 'Progression' and 'Representation'-strategies in respect to gamers and non-gamers. Only while speaking about player avatars, he vaguely alludes to the fact that both gamers and non-gamers understood and received his concepts well (Sheldon 2012: 37). Literature by other authors about the popularity of these two strategies in respect to these two groups are scarce, as well. However, there is literature dealing with the differences between gamers and non-gamers in respect to other factors, such as cognitive abilities and personality traits. One study found that gamers "exhibit better processing speed and task switching ability" than non-gamers (Kowal et al. 2018: 259). Another study found that gamers show lower neuroticism than non-gamers and, interestingly, gaming addicts (Braun et al. 2016: 406). Gamers and non-gamers seem to exhibit differences in several fields, yet when it comes to preferred gamification strategies in school, their results are mostly uniform, save for a few minor differences.

As mentioned in 4.4.4.5 and 4.4.5.5, the only difference when it comes to gender is that male participants rated all strategies higher in practicability than female participants did, which may imply that male participants believe more strongly that gamification works in school. Conversely, the literature claims that gamification in education yields better results among female students, at least concerning learning outcomes (Khan et al. 2017: 2790). Admittedly, faith in practicality and learning results cannot be directly compared, yet the difference in tendency is interesting.

Section 4.4.4.8 holds a potential answer to a question posed earlier, namely whether there is a specific group that is most open for the ‘Progression’-strategy. Figure 10 shows that the ‘Progression’-strategy is significantly more popular among 14-15-year-olds than among other participants, and it is especially unpopular among 16-year-olds. It could be concluded that an XP-based grading system is best implemented with younger students. Possibly, lower secondary would be the best place to implement it. In fact, Khan et al. have, among others, employed strategies that are similar to the ‘Progression’-strategy with students aged 12 to 15. They rewarded students with an increasing score count for correct answers, paired with an omnipresent goal they should achieve. They found that the students had significantly more fun in a gamified classroom than their peers (Khan et al. 2017: 2788). Khan et al.’s findings therefore seem to confirm the findings of this study, namely that score-based grading may be best applied in a classroom of under-16-year-olds.

4.6 Limitations and possible improvements

Participants may have interpreted the main focus of each strategy differently than intended. Although this survey deals with gamification by means of categories such as ‘Challenge’, etc., the participants were asked about their opinions on specific gamification strategies, instead. Because the specific strategies are more illustrative than the categories, the survey could not measure the participants opinions on gamification categories themselves. The participants may have had different opinions on the categories, had they featured different gamification strategies. Consequently, there is no way of telling whether the presented strategies accurately reflect the essence of the category they represent. For example, the ‘Competition’ and ‘Interaction’-strategies are both fitting in the ‘Competition’-category. The fact that these two strategies never exhibit the same value, neither regarding popularity nor practicability, is indicative of the fact that participants may have interpreted the main focus of each strategy differently.

The survey’s format makes it difficult to account for confounding variables. When participants were asked whether they had already experienced each gamification strategy, they were specifically asked to answer yes or no to “I have already experienced this (or something similar)”. Some participants may have answered yes even though what they had experienced was not truly similar regarding to the strategies presented in this survey. To illustrate, a participant may have already experienced writing a test on a computer, albeit without immediate feedback. This participant may have answered “Yes, I have experienced this or something similar” in the category ‘Feedback’, even though in the participant’s case, there was no immediate feedback given. Still, the questionnaire collected data on the popularity and practicability of several gamification strategies. While the essence of each gamification strategy can only be captured with difficulty, the results of this survey still provide insight into student’s preferences.

The participants may have given skewed answers when asked about practicality, because they had answered the question about popularity immediately beforehand. They may have felt the need to be consistent, which may have altered their perception of practicality.

Should this survey be repeated in the future, there are several things that can be improved. Firstly, the survey must be set in a way that allows participants to continue to the next question only once the current question has been comprehensively answered. If such a setting had been in place, the sample size would have amounted to almost 200, instead of 124. Secondly, participants attending FW Dornbirn should have had their own option to click when asked for their school type. In this survey, it is unclear which school type the participants of the ‘other school type’-category belong to.

Conclusion

To conclude this thesis, the two research questions from the introduction shall be revisited: “Which learning strategies found in video games can be used in education?”, and “Which gamification strategies are most popular among a demographic of 14-to-16-year-olds”?

Research question number one can be answered in a straightforward manner. There are several strategies employed by video games that can be applied to learning and many authors have outlined and categorized techniques from video games that can be used in education (Stott & Neustaedter 2013; Koivisto & Hamari 2014; Çakıroğlu et al. 2017). This thesis especially focused on Doney (2019), who presented a number of gamification strategies to employ in school. Many of her strategies have been discussed and examined previously in part 4, this thesis’ empirical part. Part 2, which is an analysis of the game *Legend of Zelda: Breath of the Wild,* also shows that video games utilize several teaching approaches that can be applied to a learning environment. Part 3, an analysis of the learning app *Duolingo,* illustrates that there are gaming elements that can be beneficial to engage learners when learning languages, as long as they utilize positive rather than negative reinforcement.

The second research question was the main focus of this thesis. The study’s age range had to be expanded since more than half of all participants proved to be older than 16 years. It has been shown that students clearly prefer some gamification strategies over others. The ‘Feedback’-strategy proved to be particularly popular, showing that students value receiving clear and immediate feedback, and possibly suggesting that they would endorse writing tests digitally on their computers. The ‘Interaction’-strategy proved almost equally popular, showing that students value interactive classroom design with a dash of competitiveness. Less popular are the strategies that resemble video games too obviously: Both the ‘Progression’-strategy and the ‘Representation’-strategy are on the bottom of the ranking. Considering these results, it can be said that students prefer those strategies that more resemble the classic understanding of learning and education, rather than experimental strategies like XP-based grading.

For me, this thesis has confirmed what I had long suspected: Video games do have elements of teaching and learning in them, and it is indeed possible to harness these elements and utilize them to motivate students for school. While it is indeed true that intrinsic motivation, which is given when playing video games, rarely appears in school, there are other psychological needs that can be catered to. Students whose needs for Autonomy, Competence, and Relatedness are satisfied will experience more motivation and engagement than others.

While there may be teachers who feel unfamiliar with or even disinclined towards video games, it cannot be denied that well-designed video games understand to utilize the science behind motivational psychology. Even if they are not of interest to some teachers, there is still a lot to learn from games and their capacity to engage the player.

In the end, it is the teacher's responsibility to teach their students, which is easier and more effective if the students are motivated. Looking back at my own childhood, fidgeting nervously in my seat in anticipation of playing my video games, I can say that there already was motivation within me – it was only misdirected. Differently put, the motivation was there, but I chose to direct it towards video games and not towards learning. This is precisely where teachers can utilize knowledge about video games to tap into said motivation and redirect it towards learning. Ultimately, drawing inspiration from gaming may truly make the classroom engaging and foster a healthy and eager approach towards learning.

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Appendix

Abstract

This thesis looks into the question whether education can be made more engaging by applying techniques and mechanics from video games. Two research questions were formulated: “Which learning strategies found in video games can be used in education?” and “Which gamification strategies are most popular among a demographic of 14-to-16-year-olds?”. An online survey was conducted, in which participants indicate how willing they would be to try out different gamification strategies in school. The survey was sent to several schools in Vorarlberg, Austria. The results show that students prefer feedback-heavy and interactive strategies over those that too obviously imitate video games, such as XP-points and video game terminology.

Diese Arbeit untersucht Videospielmechaniken, die sich im Unterricht umsetzen lassen, um Motivation zu steigern. Es wurden zwei Forschungsfragen formuliert: Welche Lernstrategien aus Videospielen können in der Bildung umgesetzt werden?“ und „Welche Gamification-Strategien sind unter 14-bis16-Jährigen am beliebtesten?“. Es wurde ein Online-Fragebogen an mehrere Schulen in Vorarlberg, Österreich, verschickt, anhand dessen Schülerinnen und Schüler angeben sollten, wie gerne sie verschiedene Gamification-Strategien im Unterricht ausprobieren würden. Die Ergebnisse zeigen, dass Schülerinnen und Schüler jene Strategien bevorzugen, die Feedback und Interaktion betonen und jene ablehnen, die Videospiele zu offensichtlich imitieren, wie etwa Erfahrungspunkte oder angewandte Videospielterminologie.

The survey's German original prompts

- **Challenge:** *Du arbeitest frei und hast die Möglichkeit, sehr fortgeschrittene Themen (z.B. fortgeschrittene Grammatik oder Vokabeln) zu lernen. Sobald du dich bereit fühlst, kannst du einen Test machen und sehen, ob du das Thema schon beherrschst.*
- **Feedback:** *Du schreibst einen digitalen Test am Computer. Du erfährst sofort, wie viele Punkte du hast.*
- **Interaction:** *Ihr spielt ein Quiz im Unterricht. Du bist mit vier anderen Schüler*innen in einem Team und ihr tretet gegen andere Teams an.*
- **Representation:** *Deine Arbeitsaufträge haben interessante Namen. Referate sind nun 'Quests', Aufsätze sind 'Crafting' und Schularbeiten sind 'Bossfights'. Außer den Namen bleibt alles beim Alten.*
- **Reflection:** *Ihr sprecht im Unterricht regelmäßig über die Entscheidungen, die ihr während des Unterrichts trefft. Diese Entscheidungen könnten etwa dein Standpunkt in einer Diskussion sein, oder Entscheidungen, die du während eines Projektes triffst.*
- **Competition:** *Du hast eine Scheckkarte, auf der deine Noten und andere schulische Leistungen gespeichert sind. Online kannst du deinen Fortschritt mitverfolgen und dich mit anderen Schüler*innen vergleichen. Du kannst entweder deinen echten Namen oder einen Nickname verwenden.*
- **Control:** *Ihr lest keine Bücher gemeinsam. Stattdessen kannst du Bücher aus einer Liste auswählen und diese lesen. Anschließend machst du Arbeitsaufträge, die du ebenfalls aus einer Liste auswählst.*
- **Progression:** *Du bekommst keine Noten. Stattdessen bekommst du für alle Tests, Schularbeiten und Hausaufgaben Erfahrungspunkte (XP). Je besser deine Arbeit, desto mehr XP bekommst du, desto schneller bekommst du einen Level-Up. Am Ende des Schuljahres musst du einen gewissen Level erreicht haben, um das Schuljahr abzuschließen.*

Das (oder etwas Ähnliches) habe ich im Unterricht schon einmal erlebt und…

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	...es hat mir gefallen.	54	43,5	43,5	43,5
	...es hat mir nicht gefallen.	12	9,7	9,7	53,2
	Habe ich noch nie erlebt.	58	46,8	46,8	100,0
	Gesamt	124	100,0	100,0	

Das würde ich gerne (wieder) ausprobieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	13	10,5	10,5	10,5
	Trifft nicht zu	25	20,2	20,2	30,6
	Trifft zu	65	52,4	52,4	83,1
	Trifft sehr zu	21	16,9	16,9	100,0
	Gesamt	124	100,0	100,0	

Das könnte im Unterricht funktionieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	12	9,7	9,7	9,7
	Trifft nicht zu	17	13,7	13,7	23,4
	Trifft zu	75	60,5	60,5	83,9
	Trifft sehr zu	20	16,1	16,1	100,0
	Gesamt	124	100,0	100,0	

Das (oder etwas Ähnliches) habe ich im Unterricht schon einmal erlebt und…

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	...es hat mir gefallen.	66	53,2	53,2	53,2
	...es hat mir nicht gefallen.	9	7,3	7,3	60,5
	Habe ich noch nie erlebt.	49	39,5	39,5	100,0
	Gesamt	124	100,0	100,0	

Das würde ich gerne (wieder) ausprobieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	5	4,0	4,0	4,0
	Trifft nicht zu	15	12,1	12,1	16,1
	Trifft zu	40	32,3	32,3	48,4
	Trifft sehr zu	64	51,6	51,6	100,0
	Gesamt	124	100,0	100,0	

Das könnte im Unterricht funktionieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	5	4,0	4,0	4,0
	Trifft nicht zu	14	11,3	11,3	15,3
	Trifft zu	49	39,5	39,5	54,8
	Trifft sehr zu	56	45,2	45,2	100,0
	Gesamt	124	100,0	100,0	

Das (oder etwas Ähnliches) habe ich im Unterricht schon einmal erlebt und…

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	...es hat mir gefallen.	83	66,9	66,9	66,9
	...es hat mir nicht gefallen.	10	8,1	8,1	75,0
	Habe ich noch nie erlebt.	31	25,0	25,0	100,0
	Gesamt	124	100,0	100,0	

Das würde ich gerne (wieder) ausprobieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	9	7,3	7,3	7,3
	Trifft nicht zu	8	6,5	6,5	13,7
	Trifft zu	44	35,5	35,5	49,2
	Trifft sehr zu	63	50,8	50,8	100,0
	Gesamt	124	100,0	100,0	

Das könnte im Unterricht funktionieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	5	4,0	4,0	4,0
	Trifft nicht zu	18	14,5	14,5	18,5
	Trifft zu	47	37,9	37,9	56,5
	Trifft sehr zu	54	43,5	43,5	100,0
	Gesamt	124	100,0	100,0	

Das (oder etwas Ähnliches) habe ich im Unterricht schon einmal erlebt und…

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	...es hat mir gefallen.	7	5,6	5,6	5,6
	...es hat mir nicht gefallen.	9	7,3	7,3	12,9
	Habe ich noch nie erlebt.	108	87,1	87,1	100,0
	Gesamt	124	100,0	100,0	

Das würde ich gerne (wieder) ausprobieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	35	28,2	28,2	28,2
	Trifft nicht zu	42	33,9	33,9	62,1
	Trifft zu	29	23,4	23,4	85,5
	Trifft sehr zu	18	14,5	14,5	100,0
	Gesamt	124	100,0	100,0	

Das könnte im Unterricht funktionieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	29	23,4	23,4	23,4
	Trifft nicht zu	35	28,2	28,2	51,6
	Trifft zu	41	33,1	33,1	84,7
	Trifft sehr zu	19	15,3	15,3	100,0
	Gesamt	124	100,0	100,0	

Das (oder etwas Ähnliches) habe ich im Unterricht schon einmal erlebt und…

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	...es hat mir gefallen.	50	40,3	40,3	40,3
	...es hat mir nicht gefallen.	11	8,9	8,9	49,2
	Habe ich noch nie erlebt.	63	50,8	50,8	100,0
	Gesamt	124	100,0	100,0	

Das würde ich gerne (wieder) ausprobieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	13	10,5	10,5	10,5
	Trifft nicht zu	32	25,8	25,8	36,3
	Trifft zu	61	49,2	49,2	85,5
	Trifft sehr zu	18	14,5	14,5	100,0
	Gesamt	124	100,0	100,0	

Das könnte im Unterricht funktionieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	11	8,9	8,9	8,9
	Trifft nicht zu	23	18,5	18,5	27,4
	Trifft zu	73	58,9	58,9	86,3
	Trifft sehr zu	17	13,7	13,7	100,0
	Gesamt	124	100,0	100,0	

Das (oder etwas Ähnliches) habe ich im Unterricht schon einmal erlebt und…

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	...es hat mir gefallen.	18	14,5	14,5	14,5
	...es hat mir nicht gefallen.	6	4,8	4,8	19,4
	Habe ich noch nie erlebt.	100	80,6	80,6	100,0
	Gesamt	124	100,0	100,0	

Das würde ich gerne (wieder) ausprobieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	15	12,1	12,1	12,1
	Trifft nicht zu	16	12,9	12,9	25,0
	Trifft zu	46	37,1	37,1	62,1
	Trifft sehr zu	47	37,9	37,9	100,0
	Gesamt	124	100,0	100,0	

Das könnte im Unterricht funktionieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	17	13,7	13,7	13,7
	Trifft nicht zu	14	11,3	11,3	25,0
	Trifft zu	48	38,7	38,7	63,7
	Trifft sehr zu	45	36,3	36,3	100,0
	Gesamt	124	100,0	100,0	

Das (oder etwas Ähnliches) habe ich im Unterricht schon einmal erlebt und…

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	...es hat mir gefallen.	30	24,2	24,2	24,2
	...es hat mir nicht gefallen.	18	14,5	14,5	38,7
	Habe ich noch nie erlebt.	76	61,3	61,3	100,0
	Gesamt	124	100,0	100,0	

Das würde ich gerne (wieder) ausprobieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	12	9,7	9,7	9,7
	Trifft nicht zu	33	26,6	26,6	36,3
	Trifft zu	46	37,1	37,1	73,4
	Trifft sehr zu	33	26,6	26,6	100,0
	Gesamt	124	100,0	100,0	

Das könnte im Unterricht funktionieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	11	8,9	8,9	8,9
	Trifft nicht zu	32	25,8	25,8	34,7
	Trifft zu	51	41,1	41,1	75,8
	Trifft sehr zu	30	24,2	24,2	100,0
	Gesamt	124	100,0	100,0	

Das (oder etwas Ähnliches) habe ich im Unterricht schon einmal erlebt und…

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	...es hat mir gefallen.	11	8,9	8,9	8,9
	...es hat mir nicht gefallen.	11	8,9	8,9	17,7
	Habe ich noch nie erlebt.	102	82,3	82,3	100,0
	Gesamt	124	100,0	100,0	

Das würde ich gerne (wieder) ausprobieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	33	26,6	26,6	26,6
	Trifft nicht zu	26	21,0	21,0	47,6
	Trifft zu	30	24,2	24,2	71,8
	Trifft sehr zu	35	28,2	28,2	100,0
	Gesamt	124	100,0	100,0	

Das könnte im Unterricht funktionieren.

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Trifft gar nicht zu	30	24,2	24,2	24,2
	Trifft nicht zu	24	19,4	19,4	43,5
	Trifft zu	41	33,1	33,1	76,6
	Trifft sehr zu	29	23,4	23,4	100,0
	Gesamt	124	100,0	100,0	

Most Popular Gamification Strategies – Gender

Gamification Strategy	Mean Value	Mean Deviance
Interaction	3,16	0.874
Feedback	3,16	0.943
Competition	3,00	1.021
Control	2,94	0.944
Challenge	2,76	0.925
Reflection	2,55	0.843
Progression	2,33	1.197
Representation	2,08	0.975

Female participants

Gamification Strategy	Mean Value	Mean Deviance
Interaction	3,41	0.879
Feedback	3,41	0.761
Competition	3,05	0.970
Reflection	2,78	0.854
Challenge	2,74	0.817
Control	2,70	0.938
Progression	2,70	1.139
Representation	2,36	1.059

Male participants

Most Popular Gamification Strategies – Age

Gamification Strategy	Mean Value	Mean Deviance
Interaction	3,26	0.893
Feedback	3,11	0.950
Competition	3,07	0.892
Control	2,80	0.980
Progression	2,72	1.213
Challenge	2,70	0.863
Reflection	2,66	0.873
Representation	2,41	1.023

Younger than 17

Gamification Strategy	Mean Value	Mean Deviance
Interaction	3,33	0.880
Feedback	3,51	0.669
Competition	2,95	1.099
Control	2,81	0.913
Challenge	2,81	0.859
Reflection	2,70	0.835
Progression	2,37	1.097
Representation	2,08	1.005

17 or older

Most Practical Gamification Strategies – Gender

Gamification Strategy	Mean Value	Mean Deviance
Feedback	3,10	0.918
Interaction	3,04	0.789
Competition	2,92	1.038
Control	2,92	0.954
Challenge	2,78	0.941
Reflection	2,73	0.861
Progression	2,37	1.093
Representation	2,27	0.908

Female participants

Gamification Strategy	Mean Value	Mean Deviance
Feedback	3,36	0.734
Interaction	3,34	0.853
Competition	3,05	0.984
Challenge	2,85	0.720
Reflection	2,81	0.758
Control	2,71	0.874
Progression	2,70	1.102
Representation	2,49	1.082

Male participants

Most Practical Gamification Strategies – Age

Gamification Strategy	Mean Value	Mean Deviance
Interaction	3,18	0.922
Competition	3,15	0.910
Feedback	3,03	0.930
Challenge	2,85	0.872
Reflection	2,82	0.785
Control	2,79	0.951
Progression	2,77	1.160
Representation	2,56	0.992

Younger than 17

Gamification Strategy	Mean Value	Mean Deviance
Feedback	3,48	0.618
Interaction	3,24	0.756
Control	2,83	0.871
Competition	2,81	1.090
Challenge	2,81	0.759
Reflection	2,73	0.807
Progression	2,35	1.003
Representation	2,25	1.015

17 or older