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The Power of Story

The influence of story on intrinsic motivation in
vocabulary learning

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Abstract

Digital games are on the rise and an increasing amount of instructors try to use elements of digital games to increase motivation in learning. Story is a game design element that is often mentioned, but rarely empirically researched and the few conducted empirical studies showed mixed results. This study will research, whether story can increase intrinsic motivation in vocabulary learning and whether an interactive story is more motivating than a regular story. Therefore, a diglot weave story was designed in German, including A1 level Dutch vocabulary. The learned vocabulary and intrinsic motivation of participants were measured for one condition teaching with interactive story, one condition teaching with story and one condition teaching the vocabulary with a drill. Intrinsic motivation was significantly higher for the interactive story condition when compared to the drill, while the difference between interactive story and story were marginally significant. Story and drill did not differ significantly. There were no significant differences in vocabulary learning across conditions.

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1. Introduction

„Imagine a world, where labor is obsolete, where work is something of the past, but miraculously, everything is still functioning better than ever before (...) I am talking about a world, harnessing the power of play.“

Yu-kai Chou at TEDxLausanne (Chou, 2014)

Gamification- harnessing the power of play?

Ambitious promises are made in the emerging field of *gamification*. Gamification is a term that describes using game design elements (leaderboards, points, etc.) in non-game contexts to increase participation and intrinsic motivation (Deterding et al., 2011). The purpose of these game elements is to make digital non-game environments more game-like, more fun and motivating to use (Larsson, 2015). Gamification is proclaimed by many to be the next generation method (Hamari et al., 2014). In the field of education many programs and apps are starting to use gamification to teach (e.g. Duolingo, CodeAcademy). Especially the E-Learning branch has an interest in making learning more fun and enjoyable (Muntean, 2011).

There are however many critical voices (Deterding, 2014; Nicholson, 2015). One problem is referred to as *pointsification* (Seaborn & Fels, 2015). While gamification originally was supposed to be - like a game - intrinsically motivating, pointsification reduces the power of play to a behavioristic reward system in form of using only points, leaderboards and badges. As Larsson (2015) criticizes, simply adding badges or points to a mundane system, will not turn it into a fun or even game-like experience. A different approach appears to be necessary to ensure long-term motivation of learners (Seaborn & Fels, 2015; Larsson, 2015; Ryan & Deci, 2017). This led to a new focus on intrinsic motivation that is also referred to as *meaningful gamification* (Larsson, 2015). To research gamification and its influence on intrinsic motivation more thoroughly, a solid theoretical basis is needed. However according to Seaborn and Fels (2015) 87% of applied gamification research failed to discuss theoretical foundations.

One of the few theories referred to in this field is the *self-determination theory*. It assumes that there are three basic needs, competence, autonomy and relatedness. The fulfillment of these three needs is necessary for an individual to feel intrinsically motivated. Therefore much theory based gamification research is focused on the fulfillment of these needs through game design elements (Mekler, Brühlmann, Tuch & Opwis, 2015; Seaborn & Fels, 2015). Game elements providing more for these needs could be more intrinsically motivating.

Another issue of current gamification is a lack of overview and separation of game elements (Seaborn & Fels, 2015). Many studies use multiple game elements therefore it is hard to conclude which element led to which outcome (Mekler, Brühlmann, Tuch & Opwis, 2015; Seaborn & Fels, 2015). Both Seaborn and Fels (2015) and Deterding (2012) suggest various different game elements should be explored in isolation to get a clear overview of their effects.

Story in gamification. What are these “game elements” exactly? Garris, Ahlers and Driskell (2002) express that there is little consensus when it comes to essential characteristics of instructional games. Looking at the elements of various games, there are not just points, badges and leaderboards, but also more complex elements, like story. Story is a complex element with many struggling to define it clearly (Novak, 2015). Iuppa and Borst (2012) define a story as a “structuring of events so that they make sense and achieve a sense of order and meaning not experienced in the real world” (p.44).

Story plays a role in most digital games. Even if it is not prominent (e.g. in Angrybirds) it still is a vital part of the game, giving the player a clear goal and purpose (Novak, 2015). Story in learning has been of interest for researchers for decades with papers about story and language learning dating as far back as 1943 (Morgan & Bailey, 1943). Story has been used by educators at schools, universities and even in the military to increase motivation in learning (Novak, 2015).

Gamification has directed new interest to the empirical evaluation of the effectiveness of story in learning. According to Wroten (2014) story-based gamified learning is a powerful tool for motivating learners. Compared to other game elements story has been evaluated in very few studies. This could be because of its complexity. The term story is difficult to define clearly. It is known in scientific literature as story, storyline, theme, narrative or even fantasy. These are used interchangeably as Novak (2015) concluded in her meta-analysis. In this article the term story will be used. Studies researching story for learning often do not specify the elements and the structure of the story which makes it difficult to compare to other studies (Novak, 2015). As one could also deduce from book sales, not every story is equally engaging. To compare stories, while not looking at their structures and components is empirically inadequate. The elements of story have to be researched, to enable researchers to put the results in context and to enable educators to use story more efficiently in classrooms and learning programs.

Current research however is lacking a structured way to produce and evaluate story. The study of Novak, Johnson, Tenenbaum & Shute (2014) for example gave participants a mere context (the protagonist should use statistics to solve cases in a job agency with statistics) and defined that as a story. As they did not see a positive effect of story on engagement, they concluded it could be the result of lacking elements of traditional story, like emotional tension or a climax. Mazarakis (2017) attempted to analyze the effect of a story on performance in a quiz. However there was no protagonist, plot or any other potential story criteria except a setting (a journey around the world). This lack of definition is leading to very mixed results that raise doubt about the effect of story on learning and motivation. It is difficult to compare studies if there is no common criteria for story. A clearer definition of the basic elements of story is needed to produce more comparable results and to advance story as a tool for learning.

Story is an important motivator for video game players (Dickey, 2006; Novak, 2015). Games however are deeply interactive, so a story without the possibility to interact, participate and make choices is missing an essential component that makes story motivating in games. Regular stories however do not offer a possibility for meaningful choice. Self-determination theory suggests this could be an important factor for intrinsic motivation. A story without choice does not offer a satisfaction of the autonomy need, a story implementing meaningful choices for the reader could drastically increase the satisfaction of the autonomy need. The complex research of story used for learning so far fundamentally lacks insight in how the introduction of choice could change the motivational appeal of a story.

The present article therefore first compared multiple story structure models and then extracted essential criteria for a context to be called a story. Based on these criteria a story and an interactive story were created for vocabulary learning. The study compared the motivational effects and vocabulary learning of three different online language learning tools targeted towards adults. The first was a drill, the second a story (without choice) and the third an interactive story. Participants completed all three and rated them on perceived intrinsic motivation.

2. Theoretical framework

2.1 What is story?

Novak (2015) compared multiple studies in her meta-analysis, to learn more about the effectiveness of story in digital instructional materials. To decide which studies would be evaluated, she gave inclusion criteria for what she considered as a story. She considered all studies if the authors referred to the used texts as story/storyline/narrative/fantasy or if there was a structure of events that made sense, without any further criteria regarding content.

Without a doubt, to gain more insight in a field so complex and to be able to compare studies, a clear description of structure should be mandatory. Creating a story is very complex, because there are literally infinite options. While there are many guide books for authors on ways to structure stories, there is no empirical framework. The following will be a short overview over various popular theories. They will serve as a base to determine the “must have” building blocks of story structure.

There are very simple ways of outlining what a story should be. Iuppa and Borst (2012) give the shortest summary yet in his work on stories and simulations. According to them, it requires a hero trying to overcome obstacles to reach his goal. This model is visualized in Figure 1.

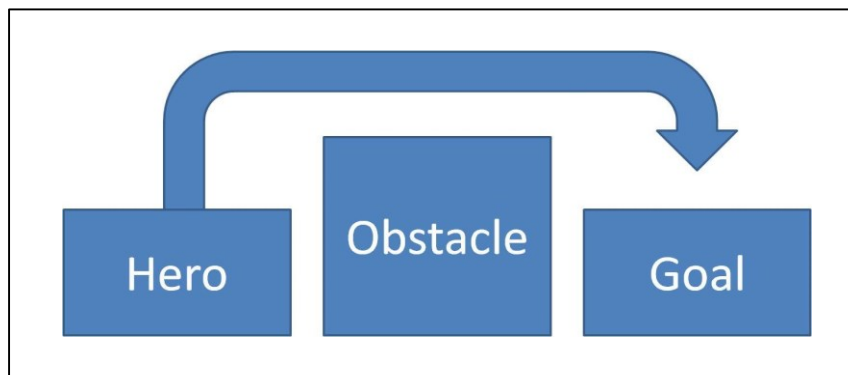


Figure 1. Iuppa and Borst's (2012) story structure model

We can conclude from this, that a story needs a protagonist and the protagonist needs a goal. The content of the story is this protagonist overcoming obstacles to achieve his goal. This is similar to the most concise way the author of the famous book “Story” (McKee, 1998). Robert McKee defines the structure of a story in the model of the quest (See Figure 2):

“For better or worse, an event throws a character's life out of balance, arousing in him the conscious and/or unconscious desire for that which he feels will restore balance, launching him on a quest for his object of desire against forces of antagonism (inner, personal, extra-personal). He may or may not achieve it. This is story in a nutshell.”

(McKee, 1998, p.197)

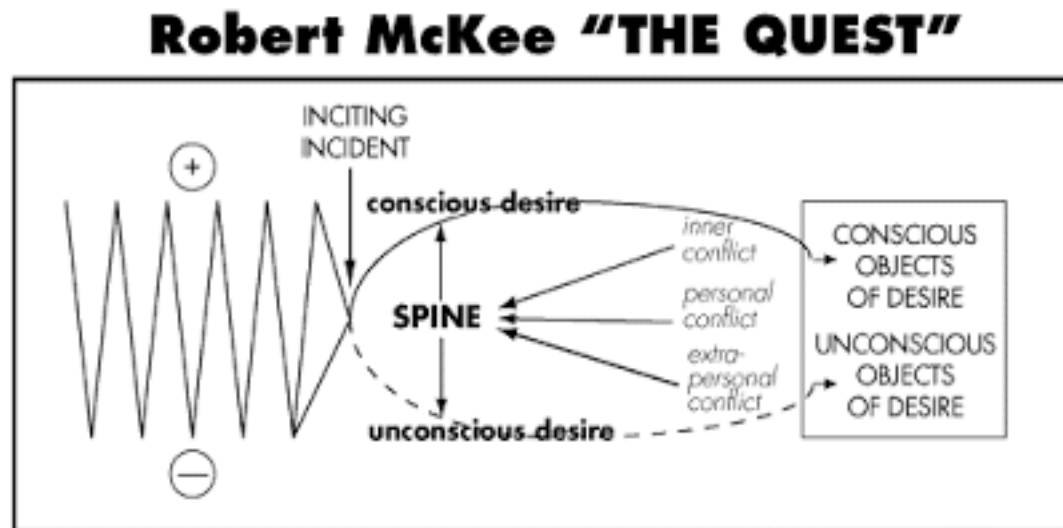


Figure 2. The Quest model, by McKee (1998)

Like in Iuppa's theory, we have the protagonist, but the conditions are more clearly defined. The protagonist begins in the Equilibrium, in a balance between successes and failures. The inciting incident throws the protagonist out of this balance with a significant negative or positive change. The spine of the story is the desire of the protagonist that moves the story forward (McKee, 1998).

While both these models sum up the essence of story, they are not so helpful in the process of constructing one, for they provide little guidance. Some important aspects however that can be deduced so far are that there should be a protagonist and that protagonist should have a goal, to resolve the crisis. So instead of just having a setting (e.g. journey around the world), there is a setting presented with a protagonist (happy farmer on his farm, does not want to leave his home). Then there is an inciting incident (farmer has to travel the world to find his kidnapped daughter), etc.

2.1.1 Variations of the classical story structure

One of the most famous and widely taught dramatic structures is the structure often accredited to Aristotle (1996) in his famous work *Poetica*. He proposes that any story must have a beginning, a middle and an end. This is supposedly the root of the three act structure. This structure has been refined throughout time and fleshed out by various renowned story theorists, such as for example Robert McKee (1998) and Syd Field (2007).

Each of the various models for the three act structure is slightly different in content (Syd Field for example is splitting the second act in two halves). At a closer look however, the underlying concepts are very similar, despite substantial differences in the terminology used. As Laurel (2013) states, terminology has been changed "by every critic since Aristotle" (p.99). This model by Laurel (2013) sums up the aspects of the theory that most popular story structures contain (See Figure 3).

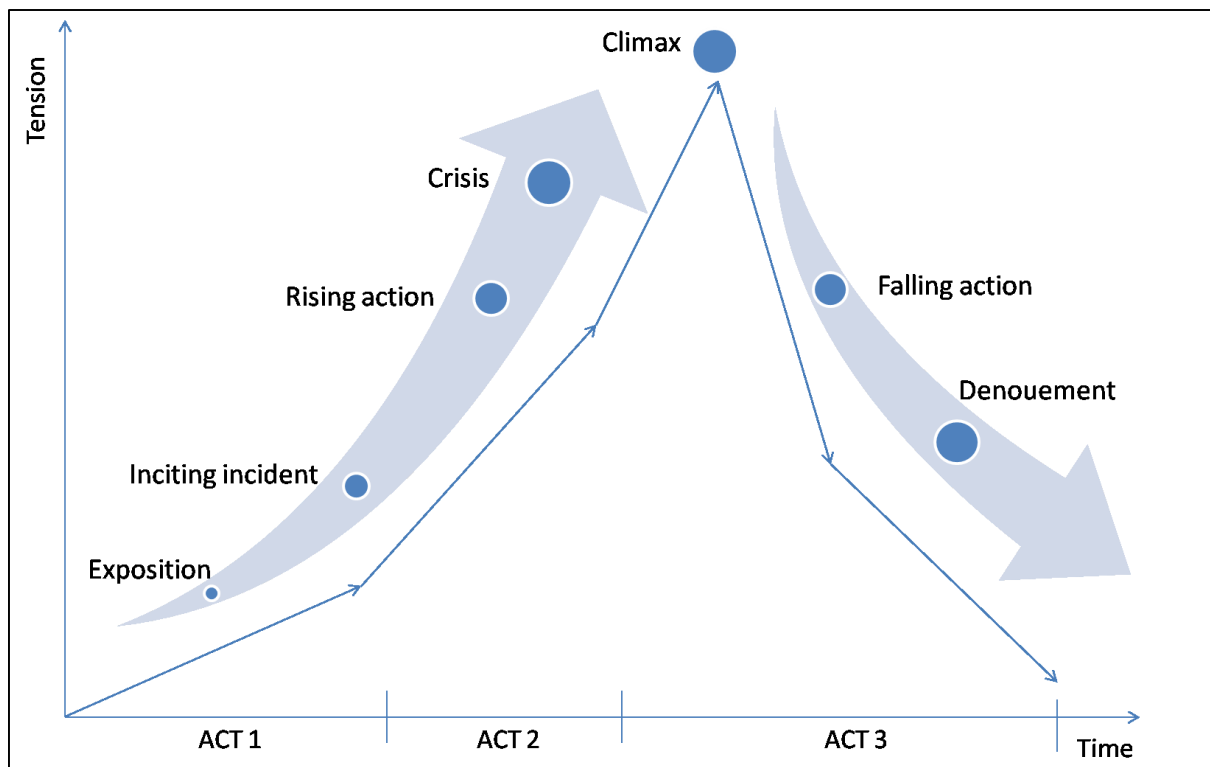


Figure 3. Adaption of Laurel (2013) comparison with a classical three act structure

The protagonist is presented in his or her everyday life in the exposition, until an inciting incident destroys the equilibrium and sets the story in motion. After that the rising action leads to the crisis which is followed by the climax. In the falling action all plot points get resolved and in the Denouement the world returns to a new equilibrium (Laurel, 2013). This structure can be discovered in most successful stories, like Lord of the Rings, Harry Potter, or Silence of the lambs, just to name a few.

2.1.2 Hero's Journey

The hero's journey is a structure that was developed by Joseph Campbell (Campbell, 2008), who analyzed Myths and fables from all over the world and extracted this structure from them. It is sometimes also called quest or monomyth. The concept was further developed by Vogler (2007) who adapted it for contemporary writing. Vogler adapted the hero's journey into the following 12 stages:

1. Ordinary World

The protagonist is introduced in his ordinary world

2. Call to Adventure

The protagonist is presented with a challenge and needs to leave his ordinary world

3. Refusal of the Call

Sometimes the protagonist refuses to leave out of fear or considers refusing. This fear could also be expressed by another character instead

4. Meeting with the Mentor

The protagonist meets someone who can offer guidance, training or equipment

5. Crossing the First Threshold

The protagonist crosses into the unfamiliar new Special World, facing different rules or values

6. Tests, Allies, Enemies

The protagonist has to pass his first tests and makes friends or allies in the Special World

7. Approach to the Inmost Cave

The protagonist approaches a challenge with his allies, confronting their fears

8. Ordeal

The protagonist is confronted with death or his worst fear, but emerges victorious

9. Reward (Seizing the Sword)

The protagonist seizes his reward for the struggle which might be an item or also knowledge

10. The Road Back

The protagonist is pursued by the vengeful opposing forces he/she disturbed by seizing the reward

11. Resurrection

The protagonist tested and purified by a sacrifice, conflict is resolved

12. Return with the Elixir

The protagonist returns to the ordinary world with the Elixir. The Elixir might stand for a treasure, or also freedom, wisdom or love

Vogler writes that the steps are “just symbols of universal life experiences“ (Vogler, p.19) and the structure should be filled in with surprises and details that make each story unique.

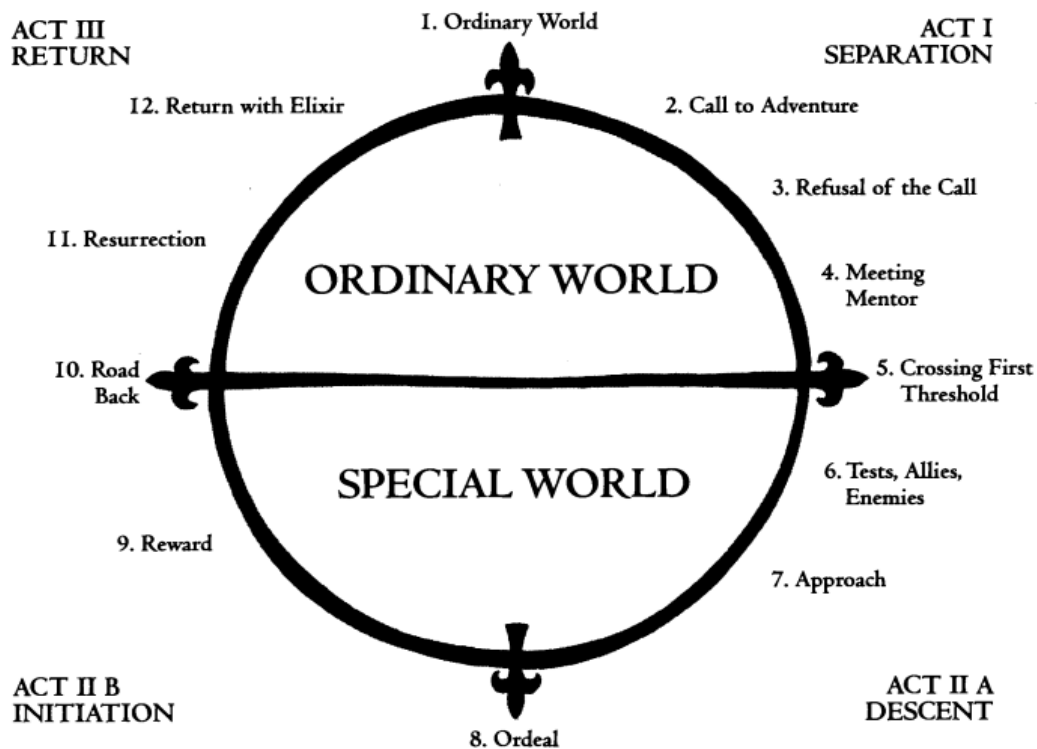


Figure 4. Hero's Journey to the special world and back, by Vogler (2007)

In Figure 4 the clear focus of the theory on the difference between the special and the ordinary world is shown. The hero has to go the full round, starting in the ordinary world, moving through the special world and eventually return enriched by the experience.

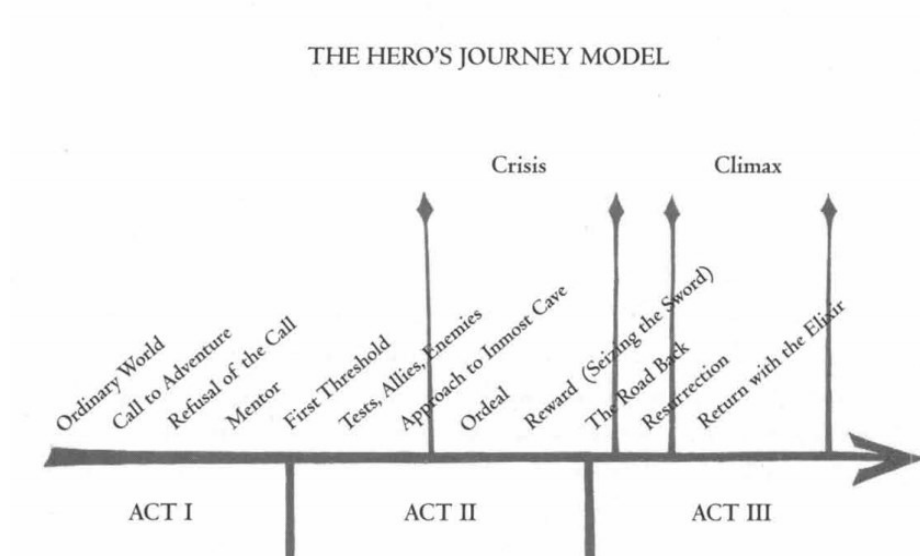


Figure 5. Hero's Journey in comparison to the three act structure, by Vogler (2007)

The Hero's Journey can be compared to the three act structure mentioned in the previous chapter, as can be seen in Figure 5. However it gives useful additional guidance and inspiration how to structure and approach a story. This might be very valuable for educators and instructional designers.

2.1.3 Synthesis

Since all these models share certain characteristics, it seems reasonable to assume that these specific characteristics must be part of any story.

- ✓ Exposition with clear protagonist
- ✓ Inciting incident, obstacles
- ✓ Goal of protagonist
- ✓ Crisis
- ✓ Climax
- ✓ Falling action, return to normal world

While these criteria do not offer much guidance to educators, they do create a defining line between providing a context (e.g. a protagonist, but no inciting incident) or a story that fulfills the basic criteria.

While there is also story theories that focus on characters more than structure, this can be a start for classifying stories and a clear cut way to separate them from mere context. In the creation of a story, clear structure can also make the story designing process easier for educators.

2.2 Intrinsic motivation and story

Intrinsic motivation means an individual is engaging in an activity because it provides enjoyment and sparks interest, not to pursue some other goal (e.g. rewards, avoiding punishment, etc.) (Ryan, & Deci, 2017). Intrinsic motivation is especially important in self-directed language e-learning, because the individual does not have a teacher providing extrinsic motivation, as it is the case in classroom teaching.

While many authors see story as an important part of gamification in learning, the theoretical basis for intrinsic motivation being increased by story is vague. Many quote Malone and Lepper (1987) who mentioned fantasy (as equivalent to story) in their model for intrinsic motivation. However, taking a closer look at the fantasy they implement in their experiments, it becomes clear that they used context (e.g. playing darts for learning fractions) not story. Another widely used theory in the field of gamification is the self-determination theory.

“The self-determination theory is core to what meaningful gamification strategies mean to accomplish. What the self-determination theory covers is a person’s motivation to make choices without any external influence and to which degree a person's behavior is self-motivated and self-determined.”

(Larsson, 2015, p.3)

Self-determination theory, short SDT takes the approach that all humans are by nature explorers, interested, curious and taking joy in learning. However this interest and enjoyment,

also known as intrinsic motivation, is dependent upon the fulfillment of three basic needs. These needs are competence, autonomy and relatedness (Ryan, & Deci, 2017). See Figure 6.

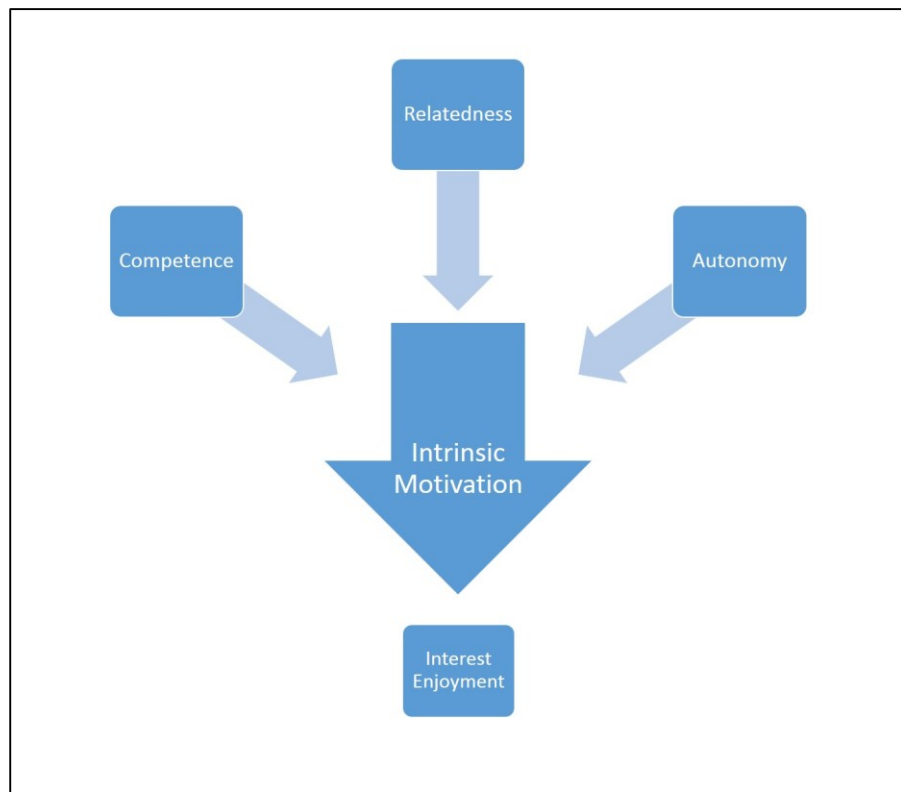


Figure 6. Fulfillment of the basic needs leads to intrinsic motivation, resulting in interest/enjoyment

According to Ryan and Deci (2017), the satisfaction of these needs reflects the essence of all human striving. Numerous studies have connected the fulfillment of these needs with increased intrinsic motivation as Ryan and Deci summarized (2017). Hence, if these three needs are fulfilled - whether by a story or another gamification technique - increased intrinsic motivation is to be expected. Ryan and Deci (2017) presume these needs to be the same for all humans, regardless of one's personal values and goals. In the following segment these needs will be defined and evaluated in relation to the potential to fulfill them with story.

2.2.1 Competence and story

Competence means a feeling of mastery. It results from challenges neither being too easy, nor too difficult, so the individual realizes the personal effort that was invested led to success (Ryan, & Deci, 2017). It is thwarted by personal criticism, social comparison and negative feedback (Ryan & Deci, 2017). A classical problem with using story in language learning is that stories are often very simplistic, to accommodate the learners lack of vocabulary and grammatical knowledge. Another possibility is that they are too difficult, as much vocabulary is needed to even understand a simple story.

Could the interactivity of a story lead to a heightened sense of competence? In their chapter on video games, Ryan and Deci (2017) mention that although virtual realities “may be in some sense unreal, psychological experiences within them can indeed be very real” (p.508). Through Immersion in the story, the needs of the protagonist can be perceived as the readers

needs as well. Potentially a person reading and making choices for the protagonist in an interactive story will feel their need of competence fulfilled if their choices let the protagonist succeed. For example, if the Protagonist survives a very dangerous situation, the reader could feel more competent.

2.2.2 Relatedness and story

Relatedness is the need for social connection. That social connection is felt, when feeling cared for by others and feeling significant around them (Ryan, & Deci, 2017). Referring back to the realness of virtual psychological experiences, it does not seem too far-fetched that relatedness could be achieved in a virtual setting, as long as the individual feels immersed in that world.

Ryan and Deci (2017) report many instances of deep relatedness of players in videogames. This goes to a point where players felt more connected with the characters than with other human players (Rigby & Ryan, 2011). No empirical studies exist on how this relatedness is created with virtual characters however.

2.2.3 Autonomy and story

Autonomy is a quintessential need, considering that competence alone cannot sustain intrinsic motivation if the individuals do not experience autonomy (Ryan & Deci, 2017). Autonomy is the need to have control over one's actions and experiences. Autonomous experiences are per definition voluntary, involving personal choice. Intrinsic motivation is enhanced, if the individual has the opportunity to behave congruent with their authentic interests and values (Ryan, & Deci, 2017).

The classical story does not provide much opportunity for autonomy. At the most, the person can choose whether or not to read the story, or which kind of story to read. This kind of choice is also known as *option choice*. This kind of choice is less motivating than the *action choice* which is an ongoing choice during an activity. Choice increases overall intrinsic motivation, especially with a moderate amount of options (Reeve, Nix & Hamm, 2003). A meta-analysis by Patall, & Robinson (2008) showed choice had a positive effect on intrinsic motivation, effort, task performance, perceived competence, subsequent learning, creativity, satisfaction and preference for challenge.

To understand the fusion of story and choice in gamification one must look at story in its natural habitat, in a game. If one looks at games, they provide a much more interactive kind of story. Even if the general story arc is fixed, the story gives the illusion of autonomy by letting the player make choices. As Novak (2015) puts it, „digital storyline-enhanced learning allows individuals to relate directly to content by exploring, changing, or manipulating actual storyline settings, events, or characters” (p.436). So what is the “missing link” between a non-interactive story and a fully developed videogame? The history of videogames provides ideas. Historically, some of the first computer games were *interactive stories*. Interactive story, also known as interactive fiction or hypertext fiction, allows the reader to influence the story. These stories were designed for readers to frequently make choices at the end of each paragraph, chapter or page.

In conclusion, story has aspects that have the potential of supporting all three basic needs and seems therefore a good fit to motivate learners of all levels for language learning. Can even beginners in language learning profit from the use of story? That will be discussed in the next section.

2.3 Vocabulary learning and story

The concept of expanding foreign language vocabulary through texts and stories in that language is known as *incidental vocabulary learning* (Ramos and Dario, 2015). Many studies have been done about extensive reading of foreign language texts and the resulting significant increase in understanding the vocabulary from context, as Ramos and Dario (2015) summed up in their review of literature.

For practical reasons these studies however usually target participants that are already advanced in the language. In traditional language education the first lesson must explain everything: pronunciation, word order, grammar and vocabulary (Burling, 1978). Despite this amount of effort the language learner is then confronted with texts that are too restricted in vocabulary to be interesting and age appropriate. Reading would be beneficial to expand the knowledge of words and grammar. Unfortunately a significant amount of vocabulary is required to be able to follow even very simple stories. Reading appropriate interesting texts in a language requires a basic vocabulary around 2000 words (Ji, 1999). Overly simplified stories however are often not attractive for the readers (Ji, 1999; Burling, 1978). Does that really mean readers have to read unappealing texts, struggle with too difficult texts or simply not read at all?

Burling (1978) developed a solution for this problem. It is called diglot weave. “Di” stands for two and “glot” means language. As the name suggests the diglot weave is a method of language instruction that weaves together two languages. By slowly and strategically weaving the new language into a text or story in a familiar language students can deduce words and grammatical constructs from context (Christensen & Yanchar, 2007). Originally, Burling developed this technique to teach French to English speakers. The vocabulary of the new language is woven into a text that is in a familiar language. This exposure should help the learners to gradually expand their vocabulary, while also seeing the words in context. As the words in the foreign language gradually increase, the learner eventually can read whole sentences in that language (Burling, 1978). Nemati (2014) showed in a study conducted with 60 Iranian students (Farsi speakers) that the diglot weave technique, when implemented in the teaching of a lesson, led to significantly better results in the English vocabulary (after five vocabulary training sessions). The control group received conventional vocabulary teaching, while in the experimental group the teacher used the words weaved into full Farsi sentences to show their meaning in context. The diglot weave example in Figure 7 below is from Ji (1999). He evaluated the effect of Chinese-English diglot reader stories on school children.

Little Red Riding Hood asked, “Oh, Nainai, how come your *yanjing* are so big?”
 Lang answered, “My *yanjing* are very big so that I can see you clearly.”
 Little Red Riding Hood asked, “Oh, Nainai, how come your *erduo* are so long?”
 Lang answered, “My *erduo* are very long so that I can hear you clearly.”
 Little Red Riding Hood asked, “Oh, Nainai, how come your *yachi* are so sharp?”
 Lang answered, “My *yachi* are very sharp so that I can eat you up quickly.”

Figure 7. Excerpt of diglot weave adaption of “Little red riding hood” by Ji (1999)

For three years Ji developed and tested diglot readers or as he calls them, *sandwich stories*, for school children in China. He describes how motivation of the children and results had increased. However this is anecdotal evidence from his work, not a scientific study.

Christensen (2007) compared a diglot reader to a drill program. She conducted a study with 24 university students in beginner Spanish. There was no difference in learned vocabulary. While reporting that participants enjoyed the diglot reader condition more, she did not specifically measure intrinsic motivation.

Burling (1978) reported that in the French class, in which he implemented the diglot reader method, the frustration of students he usually experienced in second language learning was reduced and the learner felt an increased amount of competence. The increasing number of French words provided students with a feeling of achievement and progress. He attributed the success to the fact that the reading materials never exceeded the students reading level. Several studies have supported these findings as Christensen (2007) summarizes. Silver (1997) reported less frustration and more confidence in students using a diglot reader to learn a new language.

These studies indicate that the diglot weave technique is suited for vocabulary learning. However, none of those studies was focused on story or intrinsic motivation, showing a clear need for research in that direction. None of these studies focused on adults learning language in their leisure time. The success of Duolingo, a gamified language learning app targeting adults, shows that many adult learners want to learn a language online. The original will to learn is there, however maintaining motivation in the long term is difficult. In a study for Duolingo three quarters of the participants discontinued the program within a two months span (Vesselinov & Grego, 2012). Computer programs harbor a huge potential to enable people to learn in a motivating manner. This potential has not been unleashed fully. While story is acknowledged as a tool for teaching children, because it can increase learning, interest and motivation (Creswell, 1997; Ji, 1999; Mitchell-Barrett, 2010), story in learning designed for adults has hardly been used.

The diglot weave method seems to be a promising tool for the future of language learning. It enables beginners to read relatively complex and age appropriate texts. The texts enable the learners to feel competent as they are just the right difficulty (Burling, 1978) and cover age appropriate and relatively complex topics (Ji, 1999).

While the increased motivation would also predict increased learning, this has not been replicated in empirical studies (Christensen, 2007). A potential explanation for this is the *cognitive load theory*. Cognitive load theory assumes there is a limited amount of working memory to process information. As a result an individual confronted with too much input will do worse on a task than an individual confronted with a more simplified version of that task. Story would present additional input to the working memory. This could therefore lead to less vocabulary learning as a result of the overloaded working memory. A higher cognitive load in the story and interactive story condition makes a higher vocabulary learning in these conditions unlikely according to the cognitive load theory. Studies have indicated similar vocabulary learning when comparing a story and a drill (Christensen, 2007).

4. Method

4.1. Design

This study used an experimental, cross-sectional, within-subjects design. It was conducted online. A cross-sectional design was chosen, to give an indication whether the differences between the conditions are measurable in the short term and to minimize attrition. Quantitative data was gathered about the following variables:

Dependent variable

Intrinsic motivation is the main dependent variable in this study, it was measured with a questionnaire. *Vocabulary learning* is the second dependent variable and is measured in a quiz after participants completed the three conditions.

Independent variable

The instructional method of the language course is the independent variable. There are three variations, the *interactive story*, the *story* and the *drill* as a control condition.

Research questions

H1 There is an effect of the experimental condition in terms of intrinsic motivation

H1a. The interactive story condition significantly increases intrinsic motivation compared to the drill condition

H1b. The interactive story condition significantly increases intrinsic motivation compared to the story condition

H1c. The story condition significantly increases intrinsic motivation compared to the drill condition

H2. There is no difference between conditions in terms of vocabulary learning

4.2 Participants

This study specifically targeted individuals who already speak German, but are novices at learning Dutch. Beginning Dutch speakers were excluded from participating. The study wanted to target specifically adult learners, who wanted to learn another language online. Therefore purposive sampling was done, by targeting this group of people. The participants were searched through postings of the study in language learning groups on social media and relevant online forums. Therefore the participants have a general interest in language learning, or learning of that particular language.

In total there were 16 participants, 80% of participants were female, 20% male. Participants were required to be between 18 and 65. The average age of participants was 34.4 years (SD=12.04). More than half of the participants have completed an academic degree or higher (68.8%). Participants had to state how much they like reading and video gaming, to see whether the sample already had certain preferences. 81% stated they enjoy reading a lot, whereas only 44% stated the same for gaming. 81% of participants already had experience in self-directed language learning, but only roughly half of them (38%) had been successful at it so far.

62% of participants did not answer the relatedness item, indicating that both story and interactive story were too short to relate to the people in it. Therefore this aspect was not analyzed further.

33 people started the experiment, only 16 completed it, resulting in a 51% dropout rate. On closer look, three people dropped out before only one person left the experiment after starting with the interactive story condition, whereas 5 people dropped out after starting with the drill and even 8 after starting with the story. That could indicate the drill and the story were less motivating than the interactive story, therefore less people continued the experiment in these conditions. All participants in this study were volunteers, as this is quintessential to get a valid indication of intrinsic motivation.

4.3 Instruments and measures

This section will cover the instructional materials the participants were exposed to in this study. Three different instructional approaches have been constructed, all based on the diglot reader technique. After that the tools for measuring intrinsic motivation and vocabulary learning will be discussed.

4.3.1 Story

The story was designed around the popular topic of the zombie apocalypse. The vocabulary for all three conditions was Dutch A1 vocabulary from the book *Nederlands in gang* (Boer, Kamp & Lijmbach, 2010). Many Dutch universities use for their language courses. Dutch vocabulary was integrated into the text with the diglot method. It was italicized to highlight it to the reader. Once vocabulary had been introduced it was consecutively used in Dutch (See Figure 8). One new Dutch word was introduced on average every 23 German words and 45 new words were introduced in total.

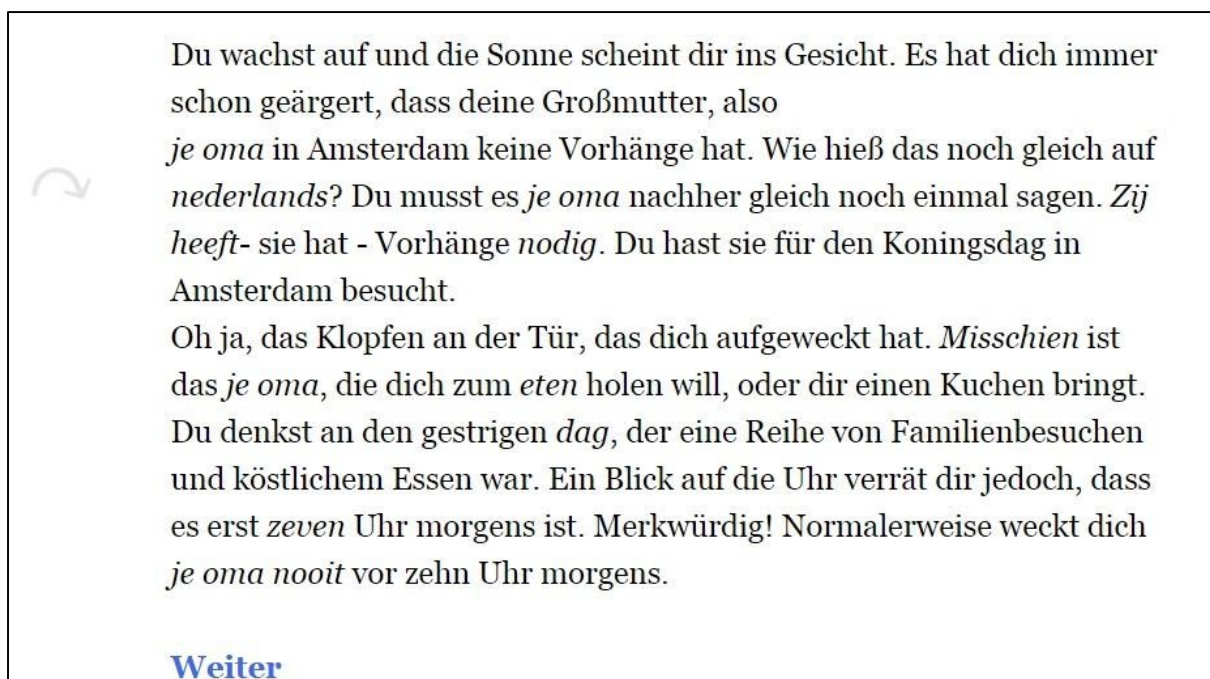


Figure 8. Sample text from the story

The story was constructed according to the story structure criteria discussed in the chapter on story (See Figure 9). It left off at the crisis, because a whole story was not feasible for the length of the study.

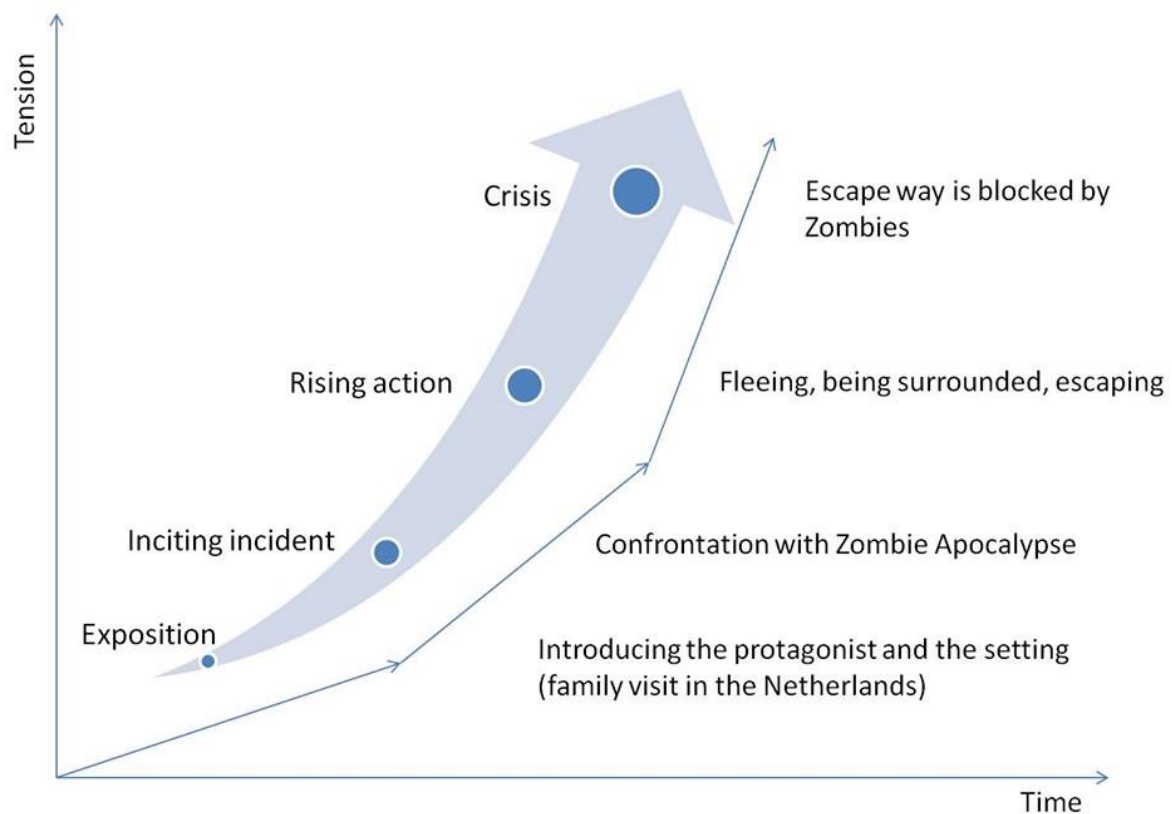


Figure 9. Structural elements of story condition of the zombie story

4.3.2 Interactive Story

The interactive story adds the element of choice to the classical story structure. In the story condition participants read the story, being unable to influence its course. In the interactive story they can decide how continue the story, choosing the next action of the protagonist by clicking on the presented options (See Figure 10). The interactive story played in the same setting as the regular story, but from a different perspective. The vocabulary count varied depending on the choices of the participants. The vocabulary itself varied slightly depending on the path choices that the participant took. On average a participant would encounter an estimated 45-50 new Dutch words and approximately 1000 words in total. Once a Dutch word had been introduced it was consecutively used in Dutch.

Du hast natürlich von dem Ausbruch gehört, aber wer soll denn solche verrückten Gerüchte glauben? Zombie-Apokalypse läuft ja wohl in *hetzelfde*, also der selben Kategorie mit Verschwörungstheorien wie die "Aliens haben Pyramiden gebaut". Aber scheinbar nicht... Denn hier kaut ein Zombie *op een been*. Oh Gott!

Du bist im Schiffsbauch und siehst keine Zombies. Eine Treppe führt nach *boven*.

Was machst du jetzt?

Geh nach boven Ich untersuche *de boot* um zu sehen ob keine, also *geen* Zombies an Bord sind. Ich prüfe oben an Deck, ob Zombies auf das Boot kommen können.

Speel dood Ich stelle mich tot und hoffe, dass mich *niemand* findet.

Figure 10. Sample text from the interactive story

4.3.3. Drill

The drill was added as a control condition. It is often used in vocabulary learning. Figure 11 demonstrates the basic drill structure.

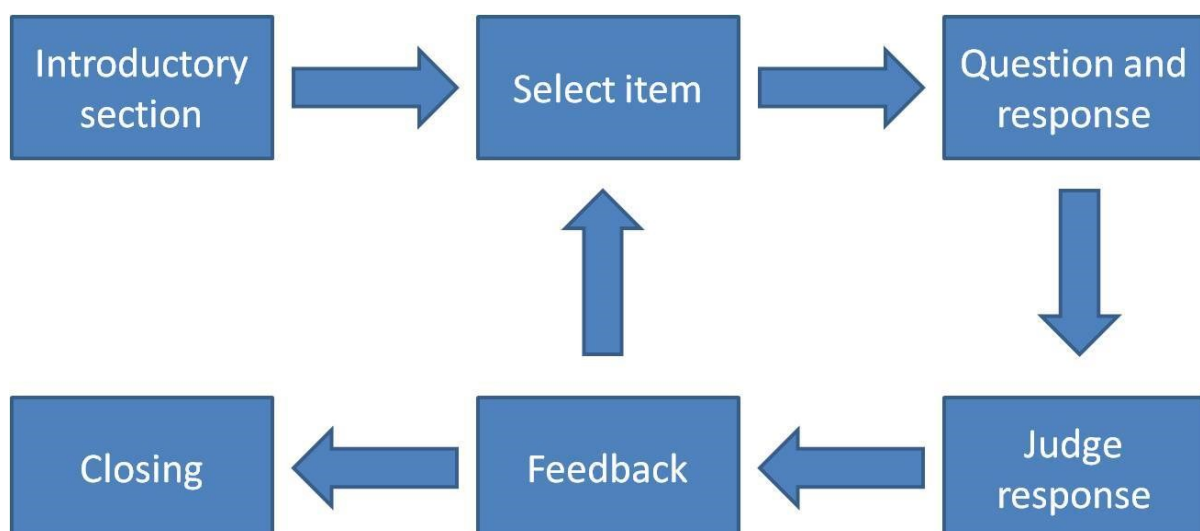


Figure 11. Drill procedure adapted from Alessi & Trollip (2000)

For this study, firstly in the introduction the participants were presented the words in diglot reader style sentences that enabled them to deduce the meaning of the words from context (See Figure 12). In total participants learned 20 Dutch words in this condition. Each new word was presented in one sentence.

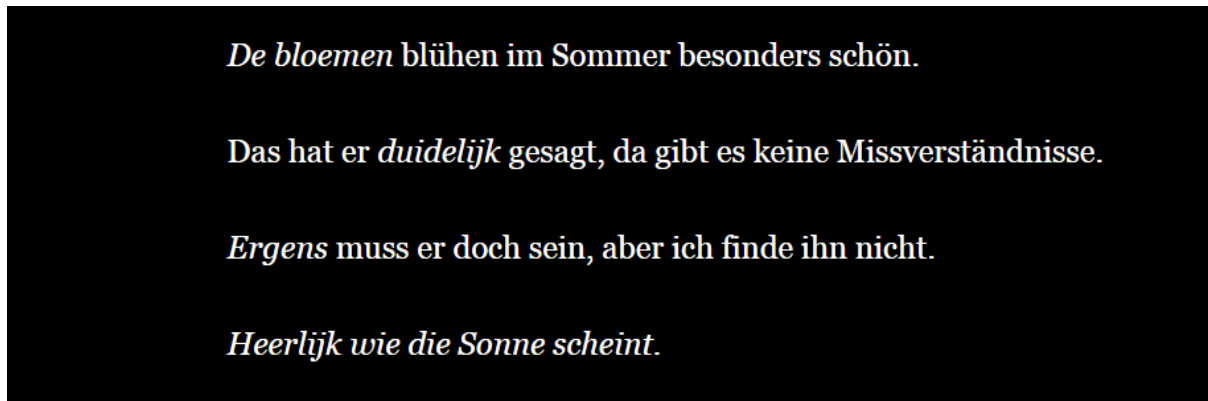


Figure 12. Sample diglot sentences from drill

The items presented in the drill were Dutch words, the required response was a translation to German. (See Figure 13). After each answer, the participants saw if their translation was correct and if not, the correct answer. After the entire drill, people were shown their total score.

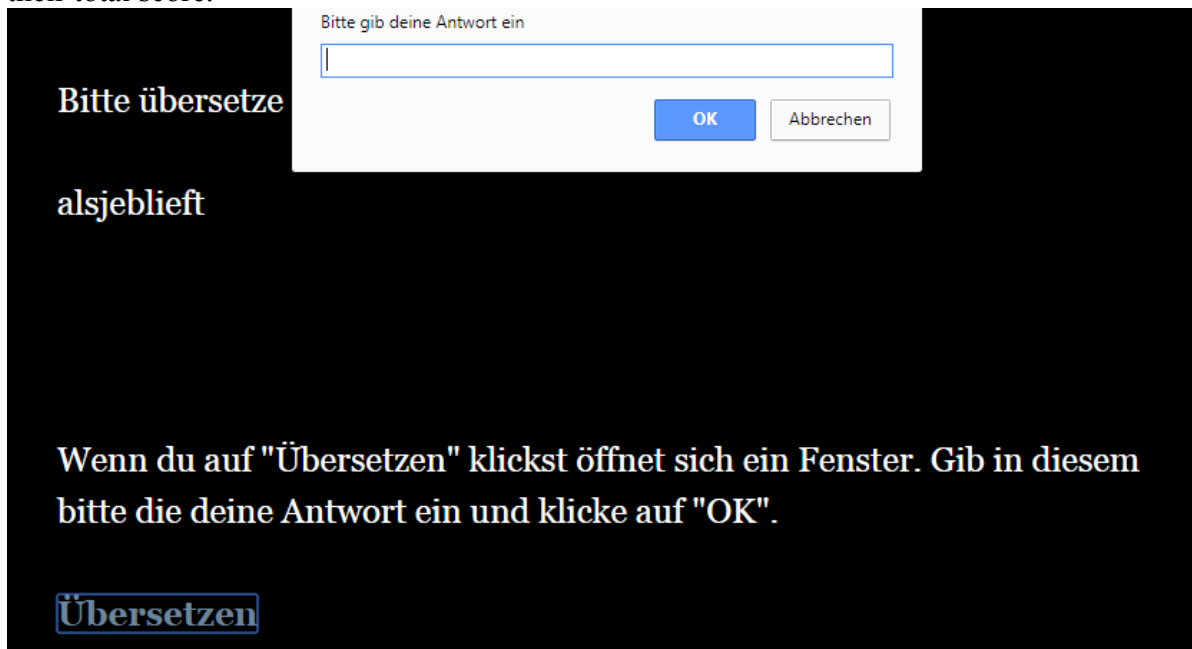
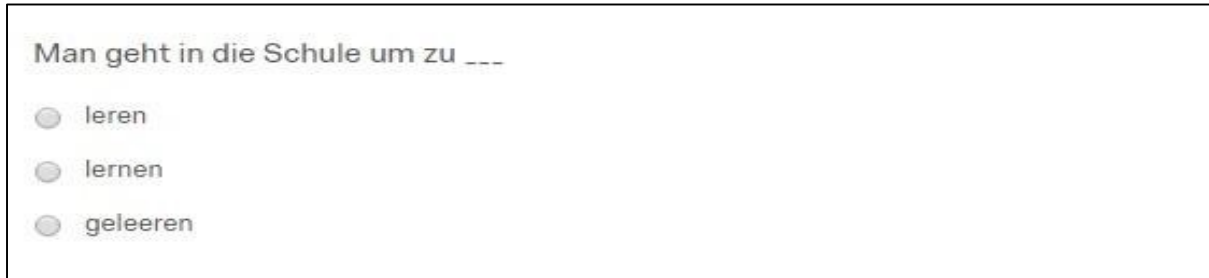


Figure 13. Drill sample

4.3.4 Quiz

The learned vocabulary was tested with a quiz in diglot reader style. This happened after all three learning conditions were completed so as not to interfere with intrinsic motivation. Testing can be perceived as controlling which decreases the feeling of autonomy

and competence and therefore intrinsic motivation (Ryan & Deci, 2017). Participants had to answer multiple choice questions that covered the vocabulary of the different courses. Only three options were provided to keep the test short and feasible. As in all three learning conditions, the vocabulary is presented in a diglot sentence. Participants had to find the correct Dutch word for the gap. A sample is shown below in Figure 14.



Man geht in die Schule um zu ___

☐ leren

☐ lernen

☐ geleeren

Figure 14. Quiz sample

4.3.5 The KIM (Kurzsкала intrinsischer Motivation)

The KIM (Wilde, Bätz, Kovaleva, & Urhahne, 2009) is the shortened and validated German version of the IMI. The IMI is a multidimensional self-report measurement tool with a Likert-type rating scale. It is designed to assess motivational structures and intrinsic motivation for various experimental activities (Deci & Ryan, 2003). The domains are based on Ryan and Deci's self-determination theory of motivation. Seaborn (2015) recommends this instrument as widely validated.

The KIM is the shortened German version of the IMI. It was chosen for this study, because it measures the relevant aspects for this study, while shortening them, to make it more feasible. The scale contains the following sections:

Perceived competence: Perceived competence assesses whether the task was the right level of challenge for participants.

Perceived choice (while performing a given activity): Perceived choice is an indicator to which degree the participants experienced autonomy within the learning conditions.

Interest/enjoyment: The interest/enjoyment subscale is also considered the “self-report measure of intrinsic motivation” (Deci & Ryan, 2003). As also mentioned in the definition of Amabile and Kramer (2007) interest and enjoyment are the outcome of intrinsic motivation.

The section of the KIM measuring *perceived tension* was excluded because it was a voluntary and anonymous online study, hence excluding the possibility of external pressure on participants.

Relatedness: Relatedness is a measure of how appreciated and well-connected an individual feels with others, in this context, with the characters of the story (Ryan & Deci, 2017). The KIM does not measure relatedness, as this aspect was added onto the IMI at a later stage (Deci & Ryan, 2003). However to have some indication whether the conditions might vary in this aspect, an item of the IMI's relatedness section was translated and added to the KIM. It could be an advantage of the story to create relatedness and thereby more intrinsic motivation compared to other forms of instruction that do not contain social interaction, like a drill.

The questions were presented in a randomized order, to not let the items seem too repetitive, as they are very similar (Deci & Ryan, 2003). A question for interest/enjoyment is shown as a sample in Figure 15. The complete questionnaire can be found in Appendix A.



Dieser Sprachkurs hat mir Spaß gemacht.

- Trifft völlig zu
- Trifft zu
- trifft teilweise zu
- teils, teils
- Trifft eher nicht zu
- Trifft nicht zu
- Trifft garnicht zu
- Keine Aussage möglich

Figure 15. Sample question from KIM

4.4 Procedure

The data was collected in an online study using social media (e.g. language learning related Facebook groups) and language learning related online forums to search for possible participants. The participants took part in one 30-40 minute session. Upon clicking the invitation link to the study, the participants were informed about the goals of the study and gave their informed consent. That was followed up by a brief demographic questionnaire. Participants then went through all three learning conditions in randomized order. For each one, they were given instructions on how the course worked. After each one they filled in the KIM that measured their self-reported intrinsic motivation for that particular task. At the end, after they finished all three conditions, they completed a quiz. In the quiz participants were presented three blocks of vocabulary questions, one for each instructional method. They were presented with five randomly chosen vocabulary questions for each block. Only vocabulary that did not occur in multiple learning conditions was chosen for this quiz, to avoid distorting the data. After each block the participants were shown their results.

Eventually they were asked for feedback on improving the courses and to sort the courses from favorite to least favorite. Afterwards they were thanked for participation and the study concluded.

4.5 Data analysis

This study was based on a repeated measures design. Testing showed that the sphericity was violated for the dependent variables *intrinsic motivation* and *vocabulary learning*. Therefore non-parametric measures had to be considered. A non-parametric Friedman's test of differences amongst repeated measures was conducted. This was followed by a Wilcoxon signed-ranks post-hoc test, to determine the significant differences between the specific conditions. The comparisons involved two-sided tests with alpha levels of 0.05 for significance.

5. Results

5.1. Intrinsic motivation

In order to investigate the effect of the learning conditions, subjects' intrinsic motivation has been compared over three experimental conditions, namely interactive story, story and drill. Intrinsic motivation was measured on a scale from 1-7, 1 being the highest intrinsic motivation and 7 the lowest. Table 1 shows the findings. The non-parametric Friedman's test of differences amongst repeated measures reveals that intrinsic motivation of participants differed significantly across conditions $\chi^2(2) = 10.57, p = 0.005$

Post hoc analyses with Wilcoxon signed-rank tests were conducted with a Bonferroni correction applied, resulting in a significance level set at $p < 0.017$. A Wilcoxon signed-ranks test indicated that there is a significant difference between the interactive story and the drill, $z = -2.97, p < .003, r = -.77$. The difference between the interactive story and the story was not significant due to the Bonferroni correction, $z = -2.19, p < .029, r = -.56$. The difference between the story and the drill was not significant, $z = -.72, p < .47, r = -.19$.

Table 1

Mean (standard deviation) and Median intrinsic motivation per condition			
Condition	Mean	(SD)	Median
Interactive story	1.52	(0.78)	1.00
Story	2.89	(1.82)	2.67
Drill	3.19	(1.96)	2.67

5.2. Vocabulary learning

To address the second hypothesis, the vocabulary learning was compared across conditions. Table 2 shows the means, medians and standard deviations. Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, therefore the Friedman's test of differences amongst repeated measures was conducted. The vocabulary learning of participants did not differ significantly across conditions $\chi^2(2) = 1.87, p = 0.39$. Since the result indicates no significant differences, no post hoc tests were conducted.

Table 2

Mean (standard deviation) and Median vocabulary learning per condition			
Condition	Mean	(SD)	Median
Interactive story	4.19	(0.98)	4.50
Story	4.00	(0.97)	4.00
Drill	4.50	(0.63)	5.00

6. Discussion

6.1 Conclusion

The purpose of this study was to investigate the differences in the learner's motivation in three different language learning environments. Motivation has been a consistent concern in theory and practice of sustainable language learning. There is a lack of knowledge on how to motivate online learners, especially in self-directed e-learning settings which are turning into an increasingly important instructional format for adult language learners.

Gamification is providing a potential base for more intrinsically motivating language learning, but the empirical evidence on the motivational effects of game elements is yet thin (Seaborn, 2015, Deterding, 2012). Story as a game element is essential to many video games yet underrepresented and underdefined. The existing evidence is mixed. This paper evaluated whether interactivity could make a difference in the motivational effect of story in a language learning setting. The data supported this hypothesis. The intrinsic motivation in the interactive story condition was significantly higher than in the drill condition. There was a tendency towards a difference between story and interactive story as well, but it was not significant. The drill and the story condition did not differ significantly which is matching the results of Novak (2014) and Christensen (2007). This raises the question, whether the lack of meaningful choice is responsible for story not being perceived more motivating than a drill. Follow-up studies should find out, whether interactivity is a key to unleashing stories full potential.

The drill might have a slight advantage to the story and interactive story as designed in this study. Based on the self-determination theory the feedback a person is receiving is important for perceived competence and therefore intrinsic motivation. In the drill condition, the performance of the individual receives direct feedback on the performance, whereas in both stories, there is no performance feedback.

An interactive story could be combined with quizzes, puzzles, mini-games or even a drill to provide competence focused feedback on learners' vocabulary learning. This way an individual could feel more competence while following the story. Other methods for providing competence enhancing feedback within a story should be explored. One could potentially enhance participants' feeling of competence and thereby their motivation by providing more positive performance feedback like "You did well in completing the task, many participants did not complete it" or "This was a very difficult one, and you were progressing very well with it" (Ryan & Deci, 2017, p.128).

As predicted, vocabulary learning did not differ between conditions, indicating that the diglot story format was equally fit for learning new vocabulary as the drill. One could deduce that the added cognitive load of the story condition was canceled out by the additional motivation.

6.2 Problems and Limitations

There were a few methodological flaws in this study. Unfortunately there is no concrete guidelines how many new words should be introduced in a diglot reader. The literature does not empirically test how many words provide the best word density to learn as much vocabulary as possible while still not feeling overwhelmed by an abundance of new words to learn. There is also no guidelines on how much text should be provided in one session.

Studies in the field of incidental learning suggest that a word should be repeated 6-8 times so that a learner will be able to understand and reproduce it (Horst, Cobb & Meara, 1998). In this study words were repeated occasionally but not in a controlled systematic manner and not as often as suggested by this literature. Future studies should address this.

Another related problem of the story condition is the different length of the conditions. Following the theoretical story structure a certain length of story was required to fit in the structural elements making it a proper story. Therefore the story condition and the interactive story condition took longer to complete and had a lot more words that the participants had to read in total. Both stories were cut off after the crisis, not following the full cycle of a story structure.

The measurement of intrinsic motivation is another point of criticism. Even though it has been evaluated with a validated questionnaire, that questionnaire is only a self-report measure. For a more wholesome view on intrinsic motivation it is recommendable to use a self-report measure combined with a behavioral measure (e.g. How much time did people spend on certain exercises or texts voluntarily) in future studies.

6.3 Future research opportunities

As there is not yet an abundance of empirical studies in the field of gamification and especially not for the gamification element of story, there are various aspects of interest to still be researched in this context. For one, there is the question how preference for different genres should be addressed within story-based gamified applications. A certain person might have a preference for the crime genre, while another person is more interested in science fiction. These preferences could account for varying motivational effects of stories. However no empirical studies address this currently. It would be interesting to compare different story conditions to see if genre preference is a relevant factor to consider when offering people stories for language learning.

Solely text based games are often repelling for people who dislike reading or are visually impaired dyslexic. They additionally present a hurdle for blind and visually impaired learners. In the long run it would be optimal to develop gamified stories that also read out the text and give sound effects to support a more auditory style of learning. Vocalization of the text could help learners to develop proper pronunciation, but also they could enhance curiosity which is considered a significant aspects of increasing intrinsic motivation in a digital interactive environment (Malone & Lepper, 1987).

A major problem of many studies regarding gamification, but also intrinsic motivation, is that there is a failure to assess long-term gains and consequences (Seaborn, 2015). This lack of long-term studies is detrimental for long arduous tasks like language learning. Therefore it is of utmost importance to also evaluate and assess the long-term consequences that gamified learning could have on intrinsic motivation (Seaborn, 2015).

As it is stated by self-determination theory, relatedness is an important concept to look out for when it comes to intrinsic motivation. Therefore it should be evaluated how readers can connect more with the characters of a story and to which extent that can influence their intrinsic motivation. In this context it is also of importance to consider the concept of *immersion* (Ryan & Deci, 2017; Ryan, Rigby & Przybylski, 2006) Immersion means that the individual gets so immersed in the game that they forget that it is a game. Stronger immersion could therefore mean stronger need satisfaction as the players perceive the game experience more intensely. This feeling immersed in a game or story could help individuals relate and feel connected to the characters more, resulting in more relatedness. Games creating higher immersion could as a result create more intrinsic motivation.

An interesting future direction for research would also be to adapt the difficulty of a learning environment to the participant. An advanced language learner may perceive a learning environment to be too easy whereas an inexperienced learner will consider it too hard. A future system should consider an adaptability of the story to the difficulty level. Interactive story could be designed as an adaptive environment. It would be recommendable

for an interactive story to ask questions that can confirm whether the participants have learned the vocabulary or not. These questions could give constructive feedback and ensure the learner their competence or help them to get further instructions to understand the word. When a participant answers questions incorrectly, an easier branch of the story can be continued to adapt to their learning level. Another option would be to create a story loop, making the learner repeat the past words. This technique is very popular in games. If the player does not succeed in a challenge, the player will have to repeat this challenge. In an interactive story, the players would then have to return to the situation later or when they have a better understanding of the words covered in the story. Only then they can succeed in the story and progress further. This relates back to feedback as discussed earlier which would be important to include in future interactive diglot readers.

This leads into the question whether the results of this study can be generalized. Firstly the sample was very small and secondly the sample only consisted out of people who already enjoyed language learning and enjoyed doing it in their free time. Therefore this study can give but an indication that interactivity could be something to look into in the future of story research in the field of gamification. Naturally this study only evaluated a self-measure of intrinsic motivation in a very short time frame therefore no conclusions can be made about long-term motivation. Still as a practical implication the addition of interactivity to a story should be considered in many fields, as it is also supported by the self-determination theory. Further research should focus especially on long-term motivation because that is a significant challenge of all current self-directed language learning tools.

This study explores an interesting connecting step between stories and games. As gamification predicts, making a story more game-like by adding interactivity increases its motivational appeal. While a story is considered a gamification element, an interactive story is already considered as an early version of a game (Bazinet, 2015). This reveals how fluent the transgression from a gamified application can be to an actual serious game or digital game based learning. Seaborn (2015) expressed how these terms are often confusing and show more similarities than a clear way to distinguish them from each other. Only time will tell how these areas will blend together to create optimized, highly motivating digital learning platforms of the future.

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Appendix A

KIM

Interest/enjoyment

1. Die Tätigkeit in der Ausstellung hat mir Spaß gemacht.
2. Ich fand die Tätigkeit in der Ausstellung sehr interessant.
3. Die Tätigkeit in der Ausstellung war unterhaltsam.

Perceived competence

1. Mit meiner Leistung in der Ausstellung bin ich zufrieden.
2. Bei der Tätigkeit in der Ausstellung stellte ich mich geschickt an.
3. Ich glaube, ich war bei der Tätigkeit in der Ausstellung ziemlich gut.

Perceived choice

1. Ich konnte die Tätigkeit in der Ausstellung selbst steuern.
2. Bei der Tätigkeit in der Ausstellung konnte ich wählen, wie ich es mache.
3. Bei der Tätigkeit in der Ausstellung konnte ich so vorgehen, wie ich es wollte.

Relatedness

1. Ich fühle mich mit den erwähnten Personen verbunden

Appendix B

Quiz

Du bist fast fertig. Zum Abschluss gibt es ein Quiz. Bitte ergänze jeweils das Niederländische Wort, das hier passt.

End of Block: Quiz Intro

Start of Block: Story Quiz

Q6.2

Sie stand sehr unter Druck und musste ____ etwas tun.

- ☐ sfoort (1)
 - ☐ onmiddellijk (2)
 - ☐ gelijkig (3)
-

Q6.3 ____ hast du dir dabei gedacht?

- ☐ Whot (1)
 - ☐ Wat (2)
 - ☐ Was (3)
-

Q6.4 Sie hatte ____ Respekt vor ihm.

- ☐ grozen (1)
 - ☐ krossen (2)
 - ☐ groten (3)
-

Q6.5 Wir haben keine Beweise. Wir können also nicht sicher sein, ____ ist er doch nicht der Täter.

- ☐ misschien (1)
 - ☐ eventoe (2)
 - ☐ veelijkt (3)
-

Q6.6 Das schaffst du nie, das ist einfach nicht ____.

- ☐ mochtelik (1)
 - ☐ waar (2)
 - ☐ mogelijk (3)
-

Q6.7 ____ ist es immer noch am schönsten.

- ☐ te huis (1)
 - ☐ te haus (2)
 - ☐ thuis (3)
-

Q6.8 Kannst du mir dein Telefon leihen, ich muss dringend jemand ____.

- ☐ bellen (1)
 - ☐ bollen (2)
 - ☐ anroepen (3)
-

Q6.9 Der Platz ist voll mit Menschen, es sind sehr ____ gekommen.

- ☐ viele (1)
 - ☐ veele (2)
 - ☐ verveele (3)
-

Q6.10 Wie viele Jungen und wie viele ____ sind es?

- ☐ madjes (1)
 - ☐ madels (2)
 - ☐ meisjes (3)
-

Q6.11 Du warst da, ____ ich habe dich gar nicht gesehen

- ☐ baar (1)
 - ☐ aber (2)
 - ☐ maar (3)
-

Start of Block: Interactive story Quiz

Q7.1 Heute hast du Geburtstag, da müssen wir ____!

- ☐ feiern (1)
 - ☐ vieren (2)
 - ☐ veieren (3)
-

Q7.2 Er hat sich beim Skifahren das ____ gebrochen

- ☐ beintje (1)
 - ☐ been (2)
 - ☐ benn (3)
-

Q7.3 Man geht in die Schule um zu ____

- ☐ leren (1)
 - ☐ lernen (2)
 - ☐ geleeren (3)
-

Q7.4 ____ hat mir Anna auch schon erzählt.

- ☐ dezeelfde (1)
 - ☐ hetzelfde (2)
 - ☐ eetzelfes (3)
-

Q7.5 ____ wollten sie das gar nicht.

- ☐ vermoedlich (1)
 - ☐ Mogelijkerwees (2)
 - ☐ Waarschijnlijk (3)
-

Q7.6 Es war schwierig ihn in dieser ____ zu finden.

- ☐ kroep (1)
 - ☐ somme (2)
 - ☐ groep (3)
-

Q7.7 Es ist so lange her. Das habe ich komplett ____.

- ☐ verbommelt (1)
 - ☐ vergeten (2)
 - ☐ vergeeld (3)
-

Q7.8 Sie kam vom Land und ist dann in die ____ gezogen

- ☐ seedloeng (1)
 - ☐ staat (2)
 - ☐ stad (3)
-

Q7.9 Sie sind wirklich nette ____.

- ☐ gemannen (1)
 - ☐ Leed (2)
 - ☐ mensen (3)
-

Q7.10 So lässt sich's gut ____.

- ☐ leeben (1)
 - ☐ leven (2)
 - ☐ geleven (3)
-

Start of Block: Drill Quiz

Q8.1 Man soll immer freundlich sein und ____ und danke sagen.

- ☐ alsjeblieft (1)
 - ☐ beed (2)
 - ☐ dankjewell (3)
-

Q8.2 Peter fährt morgen nach Rotterdam. Wir bringen ihn zum Zug aber dann müssen wir ____.

- ☐ opscheid nemen (1)
 - ☐ hoed nehmen (2)
 - ☐ afscheid nemen (3)
-

Q8.3 Der Garten ist wunderschön im Frühling. ____ blühen in allen Farben.

- ☐ Het bloempjes (1)
 - ☐ De bloemen (2)
 - ☐ De blumen (3)
-

Q8.4 Es war eine ____ Durchsage. Ich habe alles verstanden.

- ☐ klaar (1)
 - ☐ deedlijke (2)
 - ☐ duidelijke (3)
-

Q8.5 Ich habe die Schlüssel ____ liegengelassen, aber ich kann mich nicht erinnern wo.

- ☐ ergendwaar (1)
 - ☐ ergens (2)
 - ☐ somwaar (3)
-

Q8.6 ____ und die Mädchen spielen draußen, obwohl ihre Mutter es verboten hat

- ☐ De kleentjes (1)
 - ☐ De klompen (2)
 - ☐ De jongen (3)
-

Q8.7 Ich war einkaufen. Ich fand ein schönes Kleid und ging in die ____ um es anzuprobieren.

- ☐ Wandelruimtje (1)
 - ☐ Kleedkabine (2)
 - ☐ paskammer (3)
-

Q8.8 Der Polizist trinkt seinen Kaffee und bietet dem Zeugen auch ein ____ an

- ☐ kroeg (1)
 - ☐ taas (2)
 - ☐ kopje (3)
-

Q8.9 Das Wetter ist so schön, ich muss in ____ und mich in den Liegestuhl legen

- ☐ de tuin (1)
 - ☐ de gaerden (2)
 - ☐ het gartje (3)
-

Q8.10 Eine Freundin von mir holt immer frische Eier von ihrer Oma. Ihre Oma hat ____ auf ihrem Bauernhof

- ☐ pooch (1)
- ☐ kippen (2)
- ☐ hoentjes (3)