

The Playful Frame

Design and use of a gamified application
for foreign language learning

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“It is good to have an end to journey toward; but it is the journey that matters, in the end.”

— Ursula K. Le Guin, *The Left Hand of Darkness*.

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Summary

This article-based thesis investigates the potentials and challenges of gamification as a way to engage students in foreign language learning (FLL). Gamification is understood as the creation of a playful frame in the classroom context. The possibility of playfulness is introduced in learning activities through the presence of gamified structures and potentially playful elements. This thesis takes a look at the whole process of introducing gamified learning situations: from the design of an application to its use in a Norwegian upper-secondary school classroom by teachers and students. A design-based research model was used within a play-based approach to gamification to investigate *teachers' and students' experiences using a gamified application for FLL in a classroom context*. A one-year-long observational study in a French-as-a-foreign-language classroom was conducted during which empirical data were collected. Three empirical studies are used to focus on different aspects of the overarching research question and to foreground different types of data. Article #1 focuses on the implementation of the gamified application and teachers' perceptions of the presence of a playful frame in their classrooms through the thematic analysis of interview data. Article #2 investigates students' experiences of playfulness and of control over their learning through the interaction analysis of sequences of video data. Finally, Article #3 delves into the potential development of learner autonomy through a combined analysis of student interviews and the data log of the application. The findings from this thesis show promise for the use of gamification in FLL. Students became more engaged in the learning activities and were in more contact with and produced many documents in the foreign language. The gamified structure supported the development of learner autonomy and gave students the opportunity to create their own learning paths. However, although this study demonstrates the overall positive findings from the field of gamification research, it also shows that the use of a gamified application can be challenging for some teachers. Additional research and practice contributions include the design of a gamified application and the development of a theoretical framework to study playful learning situations in FLL contexts.

Samandrag

Denne artikkelbaserte avhandlinga tek føre seg bruken av spelifisering («gamification») til å engasjere elevar i framandspråkopplæring og kva potensial og utfordringar dette inneber. Omgrepet spelifisering vert nytta om det å skape ei leiken ramme rundt klasseromskonteksten. Gjennom element av leik og spelorienterte strukturar kan ein skape rom for leik i opplæringsaktivitetar. Denne avhandlinga ser på heile prosessen bak introduksjon av spelorientert læring: frå utviklinga av ein app til korleis lærarar og elevar ved ein vidaregåande skule i Noreg tok i bruk appen. Studien nyttar ein designbasert forskingsmodell i ei leikbasert tilnærming til spelifisering for å undersøkje kva erfaringar lærarane og elevane hadde med å bruke ein spelifisert app i framandspråkopplæringa i klasseromskonteksten. Det vart samla inn empiriske data gjennom ein eitt år lang observasjonsstudie av ei klasse med fransk som framandspråk. Avhandlinga nyttar tre empiriske studiar for å fokusere på ulike aspekt ved dei overordna forskingsspørsmåla og få fram ulike typar data. Den første artikkelen fokuserer på implementeringa av den spelorienterte appen og korleis lærarane oppfatta det å ha ei leiken ramme rundt undervisinga, gjennom tematisk analyse av intervjudata. Den andre artikkelen undersøker elevane si oppleving av eit leikent klasserom og oppleving av kontroll over eiga læring, gjennom interaksjonsanalyse av sekvensar med videodata. Den tredje artikkelen omhandlar den potensielle utviklinga av elevautonomi gjennom kombinert analyse av elevintervju og dataloggen til appen. Funna frå denne avhandlinga syner lovande utsikter for bruken av spelifisering i framandspråkopplæring. Elevane vart meir engasjerte i opplæringsaktivitetane, og dei kom tettare på og produserte mange dokument på framandspråket. Den spelorienterte strukturen støtta utviklinga av elevautonomi og gav elevane moglegheit til å skape sine eigne læreveggar. Men sjølv om denne studien underbyggjer dei samla sett positive funna innan forskingsfeltet spelifisering, syner studien også at bruken av ein spelorientert app kan vere utfordrande for somme lærarar. Ytterlegare bidrag innan forskning og praksis omfattar utviklinga av ein spelorientert app og utviklinga av eit teoretisk rammeverk for studiar av spelbaserte opplærings situasjonar i framandspråksundervisinga.

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PART 2: The Studies

Article #1: Cruaud, C. (under review). Designing with teachers: Contrasting teachers' experiences of the implementation of a gamified application for foreign language learners.

Article #2: Cruaud, C. (2016). The playful frame: Gamification in a French-as-a-foreign-language class. *Innovation in Language Learning and Teaching*, 1-14.

Article #3: Cruaud, C. (in press). Learner autonomy and playful learning: Students' experience of a gamified application for French as a foreign language. *ALSIC (Language Learning and Information and Communication Systems)*.

PART 1: The Extended Abstract

Chapter 1: Introduction

Proficiency in foreign languages is an important competence in our multicultural and globalised societies – not only at a personal level, where it is often a prerequisite to accessing better jobs and enriching our cultural lives, but also at a societal level, where knowledge of several foreign languages can increase communication between nations, as we ‘gain the ability to come into contact with other people and cultures’ (Utdanningsdirektoratet, 2006, p. 2). Learning a foreign language opens the door to a new culture; therefore, ‘communication in foreign languages’ is one of the eight key competences for lifelong learning as defined by the European Union (Borell Fontelles & Enestam, 2006). European citizens are encouraged to develop these competences in order to successfully and flexibly adapt to the rapidly changing, globalised world. Foreign language competence involves the proficient use of language in oral and written contexts as well as mastery of two essential skills: mediation and interculturality (Borell Fontelles & Enestam, 2006, p. 14). The European Union emphasises that knowledge of a foreign language is not limited to its grammatical structure but should also encompass its cultural codes and societal conventions. Similar aims are embodied in the Norwegian national curriculum for foreign languages (Utdanningsdirektoratet, 2006). Foreign language learning is described as both being able to use the language in various contexts and becoming acquainted with different cultures and societies. Foreign language competence is encouraged as an essential skill for participation in social contexts and democratic processes at both a national and international level (Utdanningsdirektoratet, 2006).

However, learning a foreign language is a challenging task, especially in a classroom context where students have little opportunity and time to practise and be exposed to authentic uses of a language (Skolinspektionen, 2010; Speitz & Lindemann, 2002). In the search for ways to engage students in learning activities, we could turn to informal language-learning settings for inspiration. In recent years, applications like *Duolingo* have become famous for using gamification to make language learning more fun and engaging. Gamification represents the use of game thinking or game design elements in non-game contexts (Deterding, Dixon, Khaled, & Nacke, 2011). Originally a marketing strategy, it has been applied to many different fields: physical exercise (Zombie run!, Nike +), social media (Foursquare), health (SuperBetter), and even personal finance (Mint). Its use in educational contexts is slowly developing and has shown some promise, but its implementation in FLL remains limited (Caponetto, Earp, & Ott, 2014).

The aim of this study was to examine the potential and challenges of gamification for FLL in a classroom context. Gamification, as an example of playful learning strategies, could be a way to better engage students in their learning. This study thus investigated the process of introducing gamification in a French-as-a-foreign-language class, from the development of an application to the analysis of its use in a Norwegian upper-secondary class.

1.1 Learning foreign languages in the Norwegian school system

Before turning to the focus of this study, it is necessary to present its empirical context. The Norwegian school system is divided into two parts: a compulsory part, from grade 1 to 10 (age 6 to 15), which comprises seven years of primary school (*barneskolen*) and three years of lower-secondary school (*ungdomsskolen*), followed by three years of upper-secondary school (*videregående skole*), from grade 11 to 13 (age 16 to 18). The upper-secondary level is voluntary, and students can choose to enter either a general or vocational programme. Around 98% of the students decide to continue their education in an upper-secondary school. However, drop outs are an increasing problem (Lillejord et al., 2015). This study took place in a general upper-secondary school, in grade 12 (*VG2*).

In grade 8 of lower-secondary school, pupils can choose to either start learning a foreign language or take a reinforcement course in, for example, English, Norwegian or mathematics. The most common foreign languages taught in Norwegian schools are Spanish, German and French. At the upper-secondary school level, students can choose to either continue learning the same foreign language, if applicable, or start learning a new foreign language. At the time of the study, in 2014-2015, French was the choice of 16.7% of the students who chose to study a foreign language in upper-secondary schools, while 44.1% chose Spanish and 37.9% chose German (Øksenvåg, 2016).

In 2006, the new National Curriculum for Knowledge Promotion (*Kunnskapsløftet*) was launched (K06, 2006b). This reform was aimed at simplifying the previous curriculum by focusing on five basic skills: oral skills, reading, numeracy, writing and digital skills. Teachers gained more pedagogical freedom as they could select their own methods and content best-suited for teaching basic skills. The accompanying subject curriculum for foreign languages follows the same principle and promotes the development of communicative skills and cultural understanding (Utdanningsdirektoratet, 2006). It describes three main subject areas for FLL: language learning, communication, and language, culture and society. The first subject area, *language learning*, emphasises the importance of learner autonomy by stating that learners

should be aware of their own learning strategies and establish their own learning goals accordingly. The subject area *communication* describes the learning of a foreign language as a linguistic skill through the development of four competences – listening, reading, writing and speaking – as well as interaction in various communicative contexts. The last subject area, *language, culture and society*, covers the development of cultural understanding in learners. It stresses the importance of fostering curiosity, tolerance and awareness of both foreign cultures and the learner's own cultural identity.

The Norwegian curriculum for foreign languages is implicitly inspired by the Common European Framework of Reference (CEFR) and, more precisely, by the Action-Oriented Approach (AOA) developed by the European Council in 2002 (Council of Europe, 2001). In both documents, language learning has the ultimate purpose of developing responsible citizens. The AOA views learners as social actors performing tasks, not all of them language-related, within a specific environment and field of action (Council of Europe, 2001). Within this approach, learning activities should be meaningful, relevant, and helpful towards developing learners' ability to act as citizens.

1.2 Current challenges in foreign-language teaching in Scandinavian countries

National reports from Scandinavian countries give an overview of the specific challenges of FLL and teaching in practice. The Danish report written by Andersen and Blach (2010) takes a longitudinal approach to the study of German and French in Denmark from the first years of school until university. The Swedish report investigates the teaching and learning of foreign languages in 40 lower-secondary schools in 35 different municipalities (Skolinspektionen, 2010). The Norwegian report written by Speitz and Lindemann (2002) examines the teaching and learning of foreign languages other than English in lower-secondary schools from all over Norway. Even though this report is over 10 years old, it constitutes the latest available investigation of FLL in Norway. A more recent report on the use of information and communication technologies (ICT) at school, in particular FLL classes, brought updated information on the topic of technologies (Hatlevik, Egeberg, Gudmundsdottir, Loftsgarden, & Loi, 2013). The reliability of these reports has sometimes been debated (Naezer, 2012), especially the way in which the data were collected; nonetheless, they do represent an efficient way to survey specific regional areas.

A main challenge faced by the Scandinavian countries described in these reports is the use of authentic documents in teaching and learning practices. The Norwegian report shows that

textbooks are often the only source of documents in French classes and are considered by teachers as the curriculum they should follow; accordingly, they are used to both plan and guide each lesson (Speitz & Lindemann, 2002). The same report also concluded that the dominant place of textbooks in the lesson plan is often perceived as not very motivating by students (Speitz & Lindemann, 2002). In their investigation of Danish schools, Andersen and Blach (2010) reported the need for greater variation in the resources used in the language classroom and suggested that ICT, particularly the internet, could help link the foreign language classroom to the outside world. Such tools could help build bridges between native French speakers and students in non-francophone contexts (Bérard, 2009). However, according to the Norwegian report, the use of ICT in French classes is still limited and a majority of students had never or only rarely used the internet in class (Speitz & Lindemann, 2002). A more recent report on ICT use in Norway suggested that this challenge is still present in the language classroom (Hatlevik et al., 2013).

The dominant role of textbooks in class activities can also be linked to another challenge in FLL in Scandinavian countries: giving learners the opportunity to practise the foreign language. The Norwegian report concluded that teachers speak French often or very often in the classroom (Speitz & Lindemann, 2002). In comparison, the Swedish report found that teachers only partially used the foreign language in their classrooms (Skolinspektionen, 2010). However, both reports agreed that learners are rarely given the opportunity to use the foreign language orally (Skolinspektionen, 2010; Speitz & Lindemann, 2002). The Swedish report emphasised that foreign-language teaching remains focused on grammar and texts over communicative skills (Skolinspektionen, 2010). According to Speitz and Lindemann (2002), Norwegian students have the opportunity to read and translate texts from their textbooks but rarely perform role-playing to practise oral communication. When they do have the opportunity to speak the foreign language, some students may be hesitant to do so due to anxiety. The intense focus on correctness and form over communication makes anxiety a real challenge and might transform otherwise talkative students into more taciturn learners (Horwitz, Horwitz, & Cope, 1986; Mahn, 2008).

Another recurrent challenge mentioned in the reports is the need to better adapt teaching activities to learners' expectations, interests or needs (Andersen & Blach, 2010; Skolinspektionen, 2010). Differentiated learning, which involves adapting learning activities to different students, has been present in the Norwegian national curriculum since the 1970s, where it has often been interpreted as learner autonomy (Trebbe, 2011). However, the Swedish report shows that students mostly work on the same task at the same time, a sign that differentiation is

not a common practice (Skolinspektionen, 2010). According to the same report, the need for differentiated learning is also evident in task management: Students who complete one task are often given other, similar tasks; or in some cases, must wait until the whole class has finished the exercise (Skolinspektionen, 2010). These examples show the low degree of learner autonomy – and indeed, the Swedish report concluded that students rarely participate in decision-making processes (Skolinspektionen, 2010). At a policy level, the latest Norwegian curriculum for foreign languages encourages students to take charge of their own learning, but no recent report has yet been generated to determine whether this actually happens in practice (Utdanningsdirektoratet, 2006).

The application presented in this thesis was designed to address these challenges from FLL in Scandinavian countries. Developed in collaboration with *EngageLab* (UiO), the application's focus on learners places it within a recent shift in gamification research: a user-centred, play-based approach to gamification as opposed to the first wave of marketing-oriented gamification research.

1.3 Developing gamification research: A statement of purpose

The field of gamification research has been strongly influenced by its business origins. Discourses and research studies have long been driven by the marketing sector, making the tone of the articles overly positive and their aim closer to selling the concept than discussing it objectively (Silva, 2013). Fuchs, Fizek, Ruffino, and Schrape (2014) proposed reinvesting the concept with new meanings to reclaim this area of research. This proposed shift can also be defined as a more situated understanding of gamification, where focus is placed more on the playful situation than on its artefacts (Bonenfant & Genvo, 2014; Genvo, 2013; Philippette, 2014). Focusing on players and their experiences of the playful situation means taking a holistic approach to gamification that examines the whole situation, not just specific elements. In other words, this type of research takes into account the whole frame of play – its objects, its participants, and its context. Each is studied as one part of the entire system, but they are all considered both interconnected and interdependent. Sanchez, Piau-Toffolon, et al. (2016) described this shift as moving from a game-based approach to learning to a play-based approach. In their position paper, they argued for an approach ‘focusing on the learners and taking into consideration the situation that emerges when they play rather than the artifact dedicated to play’ (Sanchez, Piau-Toffolon, et al., 2016, p. 484). This approach is quite recent and few studies have followed it thus far. It is crucial to transcend the marketing discourses that present gamification

as a panacea and research its use in authentic contexts over a longer period of time. Such research should take into account the perspectives of learners and explore their experience of a gamified classroom to obtain a better understanding of the use of gamification in education beyond the description of gamified systems. This thesis is positioned within this shift and is aimed towards the further development of a play-based holistic approach to gamification research.

1.4 Overarching aims and research topics

The overarching aim of this thesis is to *investigate teachers' and students' experiences using a gamified application for FLL in a classroom context*. In this work, *gamification* is understood as the creation of a playful frame in the classroom that must be interpreted and negotiated by both teachers and learners (see Chapter 3). To address the overarching aim of this thesis, the experience of gamification can be divided into two essential moments: *setting up a playful frame* and *interactions inside the playful frame*. Two main research questions address each of these moments:

- *Setting up the playful frame*: In what ways do teachers and learners perceive the presence of a playful frame in the classroom?
- *Inside the playful frame*: How do students interact inside a playful frame?

The first question addresses the creation of the playful frame and, more specifically, *how the presence of playfulness is perceived by teachers and students*. Article #1 and Article #2 empirically confront this issue. The second research question addresses learners' interactions inside these playful situations; in other words, *what is the students' experience of learning inside a playful frame*. Article #2 and Article #3 empirically examine this question. In each article, empirical research questions, presented in the following sections, are investigating these overarching research themes.

The three empirical studies presented in this thesis address different aspects of the overarching research goals by focusing on different research topics. Article #1 focuses on the participation of teachers in the design process and on their experience with the implementation of the gamified application in their classrooms. Through the analysis of teacher interviews and video observation data, this study explores the following research sub-questions: *How did the teachers experience the implementation of a gamified application in their classrooms?* and *In what way is the teachers' involvement in the design process reflected in their experience and in*

the account of their experience? This study is under review for publication in a book on Nordic approaches to Game-Oriented Learning Designs (NorGOLD), edited in collaboration with Aalborg University (Denmark):

Cruaud, C. (under review). Designing with teachers: Contrasting teachers' experiences of the implementation of a gamified application for foreign language learners.

The next two studies explore students' experiences with gamification. Article #2 investigates what happens in the language classroom when a gamified tool is introduced; namely, the ways in which students engage with gamified tasks and whether they have control over their own learning. In other words, this study is centred on the theme of playfulness as a way to engage inside a playful frame. It also introduces the concept of *learner autonomy* as a way to take control of a learning activity, but it does not examine how it emerges within this specific learning situation. Henriot's theory of play as an attitude and Silva's four dimensions of play are incorporated into an analytical framework to answer the following research sub-questions: *How are the students expressing playfulness* and *In which ways are they showing autonomy?* The article was published in the journal *Innovation in Language Learning and Teaching (ILLT)* as:

Cruaud, C. (2016). The playful frame: Gamification in a French-as-a-foreign-language class. *Innovation in Language Learning and Teaching*.

Article #3 investigates, in depth, the emergence of learner autonomy in relation to students' use of the gamified application in practice. After examining how learner autonomy is operationalised in the application's design, the study turns to student interviews, data logs from the application and observational data to address the following research sub-question: *Did the gamified application support students' emergence of learner autonomy and if so, in what ways?* Accordingly, the study explores how different students used the application and potentially developed their learner autonomy. The article is in the process of being published in the journal *Language Learning and Information and Communication Systems (ALSIC)*:

Cruaud, C. (in press). Learner autonomy and playful learning: Students' experience of a gamified application for French as a foreign language. *ALSIC (Language Learning and Information and Communication Systems)*.

These three empirical studies investigate playful situations in FLL contexts from the perspectives of both teachers and learners. Each study presents a different aspect of the use of gamification in classroom contexts and contributes to a better understanding of the experience of

playful learning for FLL. The studies will be presented in more detail in Chapter 7 and can be found in the second part of this thesis.

1.5 Outline of the thesis

This thesis is divided into two main parts: the extended abstract and the three empirical studies. The extended abstract contains eight chapters, including this introduction.

Chapter 2 presents a review of the research on gamification. Focus is placed on empirical studies from the field of education, and then, more precisely, from the field of FLL.

In *Chapter 3*, the theoretical framework of this thesis is developed. The first section discusses the action-oriented approach, dialogism and sociocultural concepts in relation to the context of this study. The second section develops a conceptual framework based on frame and play theories that was used in the analysis of data presented in the three articles. This framework, called *the playful frame*, was built upon Goffman's frame theory, Henriot's theory of play, and an FLL understanding of learner autonomy. The third section accounts for the use of the framework in the thesis and its implication for broader research.

Chapters 4, 5 and 6 comprise the methodological core of the thesis. In *Chapter 4*, the gamified application is described. *Chapter 5* discusses design-based research and returns to the design process of the instructional design. Lastly, *Chapter 6* provides a detailed overview of the data collection and analytical processes.

The three articles comprising this thesis are presented in *Chapter 7* and their findings are discussed in relation to the review of the field of gamification and within the frame of the two overarching research questions presented above.

Chapter 2: Review

The first chapter showed that gamification is a recent research area. In the last decade, the field has evolved from its business origins to encompass more research-based practices. The first wave of articles focused on defining the concept, describing gamified systems, and looking at the effect of gamification on users (Nacke & Deterding, 2017). This last category constitutes the main focus of the following review. Although the field of gamification research is constantly growing, the number of studies that have examined gamification in educational practices remains limited.

A systematic review of research using several databases (ERIC: OCLC, Ovid and Proquest, Web of Science, and the French databases Francis and Pascal) and the Google Scholar search engine was conducted in English and French using the keyword *gamification* combined with the following keywords: language, foreign language, second language, L2 and education (*langue, langue étrangère, langue seconde, L2, formation* and *éducation* in French). The results of these searches were reviewed and relevant studies were selected. It is worth noting that the systematic search in French found no studies. The selection criteria included peer-reviewed, empirical studies of educational contexts (upper-secondary schools or higher education). A detailed list of the studies and their main characteristics can be found in Appendix 1. The limited results of this systematic review concur with two metareviews of the field of gamification (Hamari, Koivisto, & Sarsa, 2014) and the gamification of education (Caponetto et al., 2014). Some studies reviewed in this chapter can be found in these metareviews. That said, many studies have been published in subsequent years, which is a good indication of the rapid development of the field of gamification research.

Even though the number of empirical studies of gamification is limited, their review provides interesting insights into the use of gamification for educational purposes. The first part of this chapter gives an overview of the main research themes from the field of gamification of education, while the second part emphasises FLL contexts. Finally, a brief summary of the review and a discussion of its implication for this thesis are provided.

2.1 Gamification of education: Central themes

The review of existing gamification studies revealed four main research themes in the literature. These studies were particularly interested in studying the effect of gamification on students'

participation, engagement, motivation and academic performance. These four themes will be discussed in the following sections through the presentation of key findings.

2.1.1 Participation and engagement

Students' participation and engagement are common themes in studies on gamification of education. Some aspects of students' participation overlap with the definition of students' engagement, with both concepts appearing together in some studies. *Participation* is often understood as being present and active, whereas *engagement* is sometimes used in relation to the number and variety of tasks performed. However, participation is often defined as an aspect of engagement. When students are engaged they participate more, which means they are more active. Therefore, findings in relation to both concepts will be presented together here as well.

Several studies have found that gamified learning environments have a positive effect on students' participation (Barata, Gama, Jorge, & Gonçalves, 2013; Iosup & Epema, 2014; Lombardi, 2015; Perry, 2015a, 2015b; Sanchez, Young, & Jouneau-Sion, 2016; Urias, Chust, & Carrasco, 2016). Students are generally more active in gamified environments, be they online or in the classroom. Not only are they more active, but they also complete extra tasks (Cheong, Cheong, & Filippou, 2013), such as posting more messages on forums, solving additional assignments or attending extra lectures. In his study of a gamified curriculum for English as a foreign language, Lombardi (2015) observed that engagement was greater in gamified classes than their non-gamified counterparts. He reported that in the Japanese university where his research was conducted, students had previously been uninterested in English lessons. However, during two pilot studies, students participated more in class activities and completed a greater number of extra tasks in a gamified environment. This study is presented in more detail in the second part of this chapter.

In general, students tend to complete more gamified activities and report an increase in their learning productivity as a result. In a study of a quest-based, augmented reality application (detailed in the second part of this chapter), Perry (2015a, 2015b) noted that students felt engaged in the quests. The relevance of the associated tasks to their learning and to life outside of the university was given as a main reason for this engagement. A different way of understanding this type of engagement was presented by Sanchez, Young, et al. (2016), who conducted a classroom study of the use of a gamified platform for high school students. They explained greater engagement in class work as a consequence of the creation of a reflexive space. Inside this space, students' actions take on a different meaning. This understanding of

gamification as a unique space with its own set of rules of interaction is particularly relevant to this thesis. Indeed, it is very similar to the understanding of gamification as a playful frame that will be developed in Chapter 3.

According to some studies, while students become more engaged in activities clearly linked to a gamified system, this effect does not carry over to non-gamified activities (Barata et al., 2013; Urias et al., 2016). In their gamification study of the online platform of a college course in information systems and computer engineering, Barata et al. (2013) found that although students' engagement in gamified online activities had increased, no effect was observed on their attendance at non-gamified, live lectures.

2.1.2 Satisfaction and enjoyment

In the business-oriented branch of the field, gamification principles are synonymous with an easy way to make otherwise boring activities fun. For example, Duolingo, a language learning application, has been presented as 'fun and addictive' (www.duolingo.com). In practice, however, it is not that simple. Gamification should not be regarded as a magic recipe for making everything fun and enjoyable. Indeed, in their study of gamified quiz software for undergraduate IT students, Cheong et al. (2013) found no significant effect of gamification on students' level of enjoyment. Less than one-half of the surveyed students reported feeling happy when using the gamified software

However, most other studies have agreed that gamification *does* have a positive effect on students' level of enjoyment (Barata et al., 2013; Berns, Isla-Montes, Palomo-Duarte, & Doderio, 2016; De Freitas & De Freitas, 2013; Iosup & Epema, 2014; Lombardi, 2015; Perry, 2015a, 2015b). Generally speaking, gamified learning environments and tasks are perceived as fun, playful and enjoyable by students, who express a positive attitude towards learning activities when such activities follow gamification principles; equally important, students feel that gamified courses are beneficial to their learning (De Freitas & De Freitas, 2013; Iosup & Epema, 2014). In addition, students by and large approve of the idea of continuing to use a gamified system for learning. For instance, in both Perry (2015a) and Lombardi (2015), participants reported that they would rather attend a gamified class than a more traditional class if it were offered.

2.1.3 Motivation

As just mentioned, most studies have agreed on the positive effect of gamification on student motivation (Barata et al., 2013; Hakulinen, Auvinen, & Korhonen, 2013; Huang & Hew, 2015; Sanchez, Young, et al., 2016; Urias et al., 2016). According to these studies, gamified activities are perceived as more motivating and interesting than their non-gamified counterparts (Barata et al., 2013): Students are, for instance, more motivated to learn, view and post messages, and meet deadlines (Huang & Hew, 2015; Urias et al., 2016).

Badges and other achievement systems were found to be particularly motivating for students. Achievements guide students by indicating which types of behaviour or interactions are recommended in their learning; likewise, they highlight possible pathways for learners while visualising their progress. Clear goals and paths, in addition to immediate feedback on progress, are important elements of game design, especially when it comes to creating a feeling of flow (Salen & Zimmerman, 2004). Students have reported feeling motivated by the opportunity to choose their own learning paths. In Lombardi (2015) study, students were motivated by the fact that they could freely choose which missions to work on and when.

The social aspect of gamified environments, via collaborative work or a sense of community belonging, was also found to be a particularly motivating force. Students from Perry (2015a) case study reported feeling more motivated when working together with peers; they also expressed more enjoyment of group work and learning a foreign language together.

Badges and reward systems can be especially motivating for some students who might want to start collecting them. In their study of the effect of achievement badges in an Online Learning Environment for a university course on data structures and algorithms, Hakulinen et al. (2013) observed that some students endeavoured to collect as many badges as possible and even adapted their learning activities strategically in order to receive the most rewards.

On the contrary, while gamification can be especially motivating for some students, it can have the opposite effect on others. In a short study on the gamification of an online SPSS course, Huang and Hew (2015) reported that some students were not motivated by the gamified activities. The authors did not expand on this finding but did suggest more research into why students were motivated to different degrees, in different ways, or on an unequal basis.

2.1.4 Academic performance

Although the positive effect of gamification on students' participation or motivation is widely supported by scholarly research, its effect on academic performance remains in dispute. On the

one hand, some studies have found evidence of improvement in students' performance after the introduction of gamified software or curricula, with higher scores and passing rates (Iosup & Epema, 2014). Similarly, students who participated in Cheong et al. (2013, p. 10) study reported feeling that 'the gamified learning activity improved their performance' and 'enhanced their learning effectiveness'. Likewise, Berns et al. (2016) found that gamification had a positive impact on learning outcomes. Students' fluency and language skills were improved and their test scores increased after using the gamified application. However, it could be challenged that the students' learning gain could be due as well to foreign language exposition as to gamified practices.

And indeed, on the other hand, other studies have found that notwithstanding gamification's positive effect on students' motivation and engagement in class work, performance between a gamification group and a control group was unaffected (Hakulinen et al., 2013; Huang & Hew, 2015; Urias et al., 2016). In other words, gamified activities or systems had no effect on grades or final exam scores.

More interestingly, students using gamified resources tend to focus on those activities which lead to rewards. In their study of the gamification of an online course in a technical subject within architecture and engineering, Urias et al. (2016) observed that student performance in a gamified group was lower when activities included participating in a wiki or campus-based exams (Urias et al., 2016). For these two activities, neither of which was rewarded by a bonus or badge, the gamified group performed worse and received lower grades than students from the control group. In sum, the apparent variety of findings on the topic of students' academic performance is a sign that the addition of gamified elements might not be sufficient to improve students' grades.

2.2 Gamification of foreign language learning (FLL)

This section aims to provide an overview of the state of research on gamification in the context of FLL. Three selected studies will be presented in detail in order to lend a deeper understanding of the types of methods and research designs used in the field of gamification of FLL. Then, some specific themes particular to this field will be discussed to complete the general review of the research outlined in the previous section.

2.2.1 Key studies

Three key studies from the field of gamification of FLL will be presented in this section. Each study offers a different example of the use of gamification for language learning; in doing so, the variety of available solutions and designs is also illustrated. Likewise, each study also demonstrates different research methods and contexts. Overall, the detailed description of these three research studies offers an interesting overview of the field while opening the discussion on the rationale for this doctoral thesis.

- Perry (2015a, 2015b) case study of students' motivation when using an augmented reality application for French as a foreign language;
 - Berns et al. (2016) study of motivation and learning outcomes when using a hybrid game-based application for German as a foreign language;
 - Lombardi (2015) study of two semester-long gamified classes of English as a foreign language.
-
- *Perry (2015a, 2015b)*

In her master thesis (Perry, 2015a) and article (Perry, 2015b), Perry studied the use of *Explorez*, a quest-based, augmented reality mobile application aimed at engaging and motivating university students in developing their French communication skills. Perry and a colleague designed *Explorez* using the ARIS platform, an open-source online tool for creating mobile learning games; and Voki, an online tool used to create speaking avatars. The application was developed to create a virtual francophone world in which students could practise French oral communication. The students explored this virtual world by physically moving around on a real campus. Their position was detected by their phones' GPS, and they could unlock elements of the story or collect items on the campus map. Characters represented by Voki avatars were placed in different areas of the campus and offered quests and tasks to the students. In one quest, the students had to order a coffee for a virtual character. To solve this quest, they had to physically visit the coffee shop and record an audio message in French on the application.

Perry's case study was aimed at assessing the potential of *Explorez* for French education as well as its effect on students' motivation. Perry tested the application in two French-language labs for first-year students at the University of Victoria, Canada. The weekly language labs were part of a course on written and oral French communication. Eleven students volunteered to use *Explorez* for three lab sessions. Data were collected using pre- and post-tests, focus groups and

audio recordings of the students using the tool. Perry collected data from three 50-minute sessions: an introductory session in the lab and two sessions of free use under observation.

Perry's findings showed that students generally enjoyed using *Explorez*, and most students reported that they would use it again. They felt that using the application was fun, useful, motivating and relevant to their learning. Students felt engaged in their learning because the tasks were perceived as authentic and productive. During her observations of students using *Explorez*, Perry noted that they used the target language consistently, not only to solve tasks but also in their communication with teammates (Perry, 2015a). This is an interesting finding about a challenging issue for FLL, and it shows promise for the use of gamification for FLL. However, the study was quite small, with only a few participants observed for a short duration. A longer and more detailed study of the students' interactions while using *Explorez* could have yielded a richer and more valid understanding of their learning within a gamified environment, as Perry (2015a, p. 126) remarked herself. A second iteration of the research project in which students would use the application for a whole semester would provide more information on their use of foreign language and their engagement with the learning design.

- *Berns et al. (2016)*

Similar to Perry, Berns et al. (2016) developed an application for their research study. The hybrid, game-based application, named VocabTrainer A1, was designed for German-language students (Level A1.2 CEFR) of a Spanish university. Its aim was to improve face-to-face interactions and provide opportunities to use the target language. The application was divided into two sequences. First, the students were offered individual learning tasks based on grammar and vocabulary acquisition exercises. The grammar tasks were very similar to those found in language textbooks. Students were, for example, asked to complete sentences with the correct nouns and articles; they also revised and learned vocabulary and grammar structures necessary for everyday communication in the target language and before completing the second sequence of the application. In the second sequence, students applied their language skills in lifelike communication situations to collaboratively solve a murder mystery game. Teams of students impersonated detectives and police officers and gathered information to identify a serial killer. Each member of a team was placed in a different room and given access to different clues. Students communicated in German using the text-chat feature of the application and combined their respective clues. Clues, for example, could be videos of suspects' testimonies accessed through the application by scanning QR-codes or posters of suspects taped to a wall.

The aim of Berns et al. (2016) study was to measure learner motivation, perceived usefulness and added value of the app, as well as its impact on language learning. A total of 104 students participated in a four-week study. The researchers collected data using a mixed methods design: pre- and post-tests (which were compared to the results of a first-semester writing test), focus group interviews and a technology acceptance model (TAM) survey. A TAM survey evaluates how users accept and use a new technology. In this study, the survey was used to gather data on students' experiences with the application and how they assessed its usefulness. The researchers' original hypotheses were confirmed in the results of the data analysis. On the whole, students were motivated by the use of VocabTrainer A1, which they perceived as useful and relevant for meeting their language-learning needs. The analysis of the pre- and post-tests showed a significant improvement in language proficiency. These results are promising and shed light on a variety of important aspects regarding the use of gamification, including increased learner motivation and the greater use of a foreign language. However, a similar limitation to Perry's (2015a, 2015b) study can be found: The students only used the application for a four-week period. Following students for a longer period of use could reveal the impact of gamification on students' learning outcomes and motivation in a more valid way. Another limitation lies in the design of the application. In their introduction, Berns et al. (2016) made a remark about the lack of face-to-face interaction and negotiation in foreign language in university language classes. Yet, they did not address this issue in their design. In the second sequence, when students were working collaboratively on what was intended to represent lifelike situations, they communicated through text chat in the application even though they were all physically present on campus. A different design of the second phase that would take advantage of the presence of learners could address the issue of face-to-face interactions.

▪ *Lombardi (2015)*

Contrary to the two previous studies, Lombardi (2015) did not develop a digital application. He designed a paper-based gamified curriculum for an English-as-a-foreign-language class (Level A2 CEFR) at a Japanese university. In addition to its FLL setting, this study was interesting insofar as it showed that gamification does not need to be digitalised. The same principles of playfulness can be used with a variety of supports. Lombardi was inspired by role-playing games (RPGs). He created a fantasy kingdom named Fudukai, where students were heroes in training. In this kingdom, students had to complete missions by actively using the official language of Fudukai: English. The teacher became a *senpai* (Japanese for mentor or advisor) and guided the

students on their learning path. Students earned points for completing missions, which they could report on their individual hero sheet, named the *character sheet*. On one side of the sheet, students could draw or glue their avatars, write their names, and indicate their hero names. On the other side, they collected points for each mission in a points chart stamped by the teacher. Two types of missions were available: weekly missions that acted as a direct link with course progression, and extra missions that students could select from a list and complete at any time. These missions were meant to encourage participation in the class and the use of the target language. At the end of the course, points were converted into a course grade. Students began the year with the lowest grade possible, and then worked their way up the grade chart by collecting points. This grading system was inspired by Sheldon (2012) multiplayer classroom, where an author recounts his experience using an RPG structure in the design of coursework.

In this research study, Lombardi was interested in exploring the effect of game dynamics on students' engagement and motivation. He collected observational data from two semester-long pilot classes. A total of 45 students were observed by the teacher-researcher. In addition to observational data, students answered a questionnaire on the last day of each semester. They were asked to comment on their experiences and evaluate the gamified class. The findings showed that a great majority of the students in the first pilot study (91%) and all students in the second pilot study enjoyed the gamified learning experience. They particularly liked the mission system, which gave them the opportunity to choose their own learning path during the semester. Almost all of the participants in the survey declared that they would gladly participate in a similar class again. Other results showed that students were more engaged in the class activities than during previous non-gamified semesters. They enjoyed having the opportunity to speak the language and demonstrated a positive attitude towards the experience over the course of the whole semester.

In this example of gamification of FLL, Lombardi framed his English class as an RPG universe. This frame is especially relevant to the work done in this thesis towards understanding gamification as the playful framing of learning activities. Although Lombardi did not dwell on this theoretical aspect of gamification, his use of an RPG frame is similar to the playful frame developed here, in Chapter 3. The results of Lombardi's study were on the whole very positive. However, he did not discuss the dual roles of teacher and researcher and their potential effect on the analysis of the observational data. The whole study was based on observations and students' self-reports of their experiences. The validity of the results could have been strengthened by

using an additional data source or a more perennial observation method; for example, video recording.

2.2.2 Themes specific to FLL

In the presented empirical studies, three themes stand out as especially significant for the field of FLL research, each of which is discussed in this section: the use of a foreign language, learner anxiety and autonomy.

The use of a foreign language

The use of a foreign language is an important theme in FLL research. A good learning environment gives learners the opportunity to practise the language. In gamified classes, students use the foreign language more than they would in regular classes (Lombardi, 2015; Perry, 2015a). Students also perceive their use of the language as more useful since the associated tasks are closer to real-life situations. They use the language not just to solve grammar exercises but also to communicate and solve complex missions (Lombardi, 2015).

Perry (2015a) observed students as they completed quests on campus. She noted that students used the target language consistently, both to solve tasks and communicate inside groups. This finding is particularly interesting since it is usually very difficult to persuade the students to only speak in the foreign language. In most FLL classes, students would naturally turn to their own language when discussing the organisation of their work on tasks. However, the validity of this result is somewhat questionable. Perry observed the different groups of students for only a short time (two hours of unguided use), and her presence in the small group might have influenced their use of the foreign language.

Anxiety

Learner anxiety often stands in the way of language practice or participation in class activities (Horwitz et al., 1986; Saito & Samimy, 1996), which a playful approach to learning could help reduce. Being playful means taking a different attitude towards an activity (see Chapter 3), and this new attitude (or identity) can help students use the foreign language by boosting confidence (Reinders & Wattana, 2012). Studies on the gamification of FLL have shown that students feel less anxious when speaking a foreign language via gamified applications than when doing so in a normal class (Berns et al., 2016; Lombardi, 2015; Perry, 2015a). Being in smaller groups and the playfulness of the activity appear to help students feel more at ease insofar as they could use the

foreign language more than usual. This finding is confirmed by the fact that most students participate more in class activities and use the foreign language more extensively than in a non-gamified class (Lombardi, 2015; Perry, 2015a).

Learner autonomy

Learner autonomy is an important concept in this thesis. However, few research studies have looked into the development of learner autonomy in relation to the use of gamification in FLL contexts. If learner autonomy is not directly researched or mentioned in the FLL studies presented above, some elements could be linked to the definition of the concept. Learner autonomy is traditionally defined as *taking control over one's learning* (Holec, 1979). Both Lombardi (2015) and Perry (2015a, 2015b) mentioned in their results that learners enjoyed being in control of their learning. The gamified structures let them adapt the amount and type of tasks to their own schedules and interests. Although the fact that the students could choose their own learning path inside the quests or missions was not studied through the lens of learner autonomy, its positive effect on students' motivation and engagement is promising.

2.3 Summary

The gamification of education has been defined as the use of 'game-mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems' (Kapp, 2012, p. 10). And indeed, a review of empirical research on the use of gamification in educational contexts has shown generally positive results. Gamification seems to enhance learners' engagement in class work, their motivation to learn, and their enjoyment in the classroom. Gamification also seems to be able to address some main issues from the field of FLL, such as learner anxiety or the use of a foreign language. Only on the theme of academic performance were the results more nuanced. But, in general, negative results are scarce and the review of these studies paints an overall positive impression of the potential of gamification in educational contexts. Nacke and Deterding (2017) saw this lack of negative results as a consequence of the relative novelty of this field of research as well as the absence of a more critical or nuanced understanding of gamified situations. They continued by noting that we are now entering a new phase in the history of gamification research – its maturity. Each recent study 'marks a step forward in theoretical considerateness, methodological rigour, and differentiated conclusions' (Nacke & Deterding, 2017, p. 1).

This review contains many studies that Nacke and Deterding (2017) would place within the first wave of the history of gamification research: effect studies from the field of gamification of education. The studies that have examined FLL contexts are more recent and often used a qualitative or mixed-methods approach to research the experiences of students in a gamified course. However, most studies only looked at the same students for a short period of time: from three hours to a semester. Only one study followed its participants for a whole school year (Sanchez, Young, et al., 2016). It might be difficult to draw conclusions about the students' experience of a gamified resource when they used it for only a few weeks. Moreover, when offered a new tool or technology, it is common to be more engaged at first due to what could be called *the novelty effect*. Additionally, few studies have researched the same learning situation long enough to go beyond this novelty effect phase.

Another interesting conclusion from this review is that most studies have focused on one specific element of design, on a gamified artefact or on the effect of a gamified resource on a few variables. In the introduction chapter, a shift towards a play-based approach to research on gamification was presented. This shift is aimed at developing the field of gamification research further by looking beyond the play artefact. It could also be linked to the new wave of gamification research, which aims to develop a theory-driven empirical study that focuses more on the 'how?' than on the 'what?' (Nacke & Deterding, 2017).

This thesis subscribes to this shift towards a play-based understanding of gamification and takes a holistic approach to playful learning situations. Gamification is understood as a way to create potentially playful situations (see Chapter 3). This thesis aims to better understand playful situations by looking not just at the design of the resource but also – and especially – at how students perceive the situation and what they do when they use the application. The longitudinal aspect of this research project and the variety of data collected create a deeper understanding of the students' experiences. It is important to follow the same students for a longer period of time and to collect different types of data to give a better overview of their experiences. Finally, this research thesis contributes to bridging the field of FLL research with the field of gamification research by studying gamification principles in FLL contexts. Gamification has great potential for learning and especially for FLL. The inclusion of playfulness may help students use the foreign language more freely and engage them in their learning. It might also serve as a way to address some of the challenges from the field of FLL and to bring the practice closer to the ideals of the educational paradigm of the action-oriented approach (AOA) (see Chapter 1). This field of research needs to be developed further; in

particular, more empirical studies in the context of FLL are needed. Therefore, the following chapter will present the theoretical framework of this thesis, which can be used to empirically study playful situations in educational contexts.

Chapter 3: Theory

Chapter 2 demonstrated the need for theory-driven gamification research. In this chapter, the theoretical positioning of the thesis and its main theoretical concepts are discussed. This thesis is positioned inside a dialogic and sociocultural perspective to learning. These perspectives offer a human and social understanding of learning coherent with the current educational paradigm for foreign-language learning: the action-oriented approach (AOA).

A presentation of the AOA and a discussion of relevant concepts from dialogism and sociocultural theories will form the theoretical positioning of this thesis. Then, the conceptual framework will be developed. Theories of *play*, especially from the French philosopher Henriot (1969), and the concept of *frame* as developed by Goffman (1961, 1974, 1981) will be discussed along with the concept of *learner autonomy*. Finally, the last section will briefly account for the use of the developed conceptual framework in the thesis and its implication for research.

3.1 The action-oriented approach

The action-oriented approach (AOA) was first developed in the Common European Framework of Reference for Languages (CEFR) (Council of Europe, 2001). The approach seeks to develop the ability of learners, as social actors, to perform tasks together in authentic situations (Rosen, 2010). This paradigm is in some aspects a continuation of the communicative approaches of the 1990s, which attempted to bring foreign-language teaching closer to real-life communicative situations. The AOA views learning as a social and collaborative action (Rosen, 2010) accomplished together, through interactions and mediation. It is through others, by transforming in a personal and creative way what has already been learned by a human community, that we learn and make meaning of the world around us (Rosen, 2010). This perspective on learning denotes the sociocultural background of the AOA, which can also be seen in the social dimension of learning. The AOA, as the perspective of social action, views

users and learners of a language primarily as ‘social agents’, i.e. members of society who have tasks (not exclusively language-related) to accomplish in a given set of circumstances, in a specific environment and within a particular field of action. (Council of Europe, 2001, p. 9)

The AOA aims to develop critical and autonomous learners, and also responsible and supportive citizens, capable of working collaboratively with others to solve complex tasks. Learners should contribute in their own way to the collaborative action by contributing their specific knowledge or skills. This pooling of a variety of skills to act together is supposed to

mimic the reality outside of the classroom, where not everyone is expected to develop the same skills but everyone should be able to work with peers. This is also closer to the reality of the classroom, where ‘no two users of a language, whether native speakers or foreign learners, have exactly the same competences or develop them in the same way’ (Council of Europe, 2001, p. 17). Autonomous learners who know how to learn will be able to adapt to any type of situation.

To create more authenticity, tasks are not limited to language tasks. They instead represent the situations students would encounter in society, where the use of foreign language is but one strategy to reach a particular goal. In order to do so, ICT and in particular the internet are useful tools, as they can link the classrooms with the outside world, making learning tasks more authentic (Rosen, 2010). These tasks should mobilise not only the linguistic competence of learners, but all the elements of discourse: non-verbal communication, context, attitude, etc. This understanding of language, not as structure but situated discourse, is essentially dialogic (Linell, 1998). The influence of dialogic theories in the CEFRL is also clear in the following description of students’ interactions and dialogue:

In interaction at least two individuals participate in an oral and/or written exchange in which production and reception alternate and may in fact overlap in oral communication. Not only may two interlocutors be speaking and yet listening to each other simultaneously. Even where turn-taking is strictly respected, the listener is generally already forecasting the remainder of the speaker’s message and preparing a response. Learning to interact thus involves more than learning to receive and to produce utterances. High importance is generally attributed to interaction in language use and learning in view of its central role in communication. (Council of Europe, 2001, p. 14)

The relation between the AOA, dialogism and sociocultural perspectives justifies the theoretical positioning of this thesis. The next section will make this relation clearer through the discussion of central concepts from these theoretical fields.

3.2 A dialogic and sociocultural perspective to learning

The fields of dialogism and sociocultural theories are very extensive, and the purpose of this section is not to give an exhaustive presentation of each. It will instead focus on the concepts most relevant to this thesis and try to answer a few central questions: what is dialogism?; what is the focus of a dialogic approach?; what is learning within a dialogic approach?; and what is the role of tools and technology in a sociocultural approach?

3.2.1 What is dialogism?

Dialogism is a perspective on language that sets humans, as social beings, at the centre of everything. It is an approach to discourse and human interaction that ‘insists on the inherently sociocultural nature of discursive activities and dialogue’ (Linell, 1998, p. 47). Linell (1998, p. 67) describes it as a ‘general framework for understanding discourse, cognition and communication’. Whereas Bakhtin (1986), the central figure of dialogism, was mostly analysing literary texts, most recent dialogic thinkers have been looking at authentic talk-in-interaction (Linell, 1998; Wegerif, 2007, 2013; Wertsch, 1991).

Dialogism is often presented in opposition to monologism (Bakhtin, 1986; Linell, 1998; Wegerif, 2007). A monologic approach understands cognition and communication as separate processes (Linell, 1998). An individual A has a thought or a representation in mind and expresses it through communication. An individual B receives the thought through communication and internalises it in her or his own mind. The speaker is the only source of this contribution and the listener passively receives it. In complete opposition to this view, dialogism sees cognition and communication as simultaneous processes (Linell, 1998): ‘Signs emerge ... only in the process of interaction between one individual consciousness and another’ (Voloshinov, 1986, p. 11) in ‘a communication event ... [between] at least two social beings’ (Randel, Morris, Wetzel, & Whitehill, 1992, pp. 4-5). Meanings are created through and in interaction with others. They are negotiated, evaluated and contextually produced in social interaction, in every dialogue. Reaching an understanding is accomplished together, even in the absence of physical proximity. In dialogue we not only talk to make ourselves understood, but also to understand what we say and think: ‘the speaker is also a recipient for his own utterance’ (Linell, 1998, p. 94).

3.2.2 What is the focus of a dialogic approach?

Dialogues and interactions, as the spaces in which meanings are created and negotiated, should be the focus of the analysis for researchers within a dialogic approach. Analysing dialogues and interactions gives access to the meaning-making processes of the participants and to their understandings. More specifically, the voices and meanings in a dialogue can be analysed by looking at utterances. Bakhtin (1986) described an *utterance* as the unit of analysis of communication. In opposition, words and sentences as linguistic units of analysis have only a grammatical value and cannot carry the expressive intonation, responsivity or addressivity that utterances do.

However, beyond utterances, Linell (1998) emphasised the importance of not only looking at actions and interactions, but also at the contexts in which they occur. In the analysis of meanings and actions, the researcher should not talk about individual speakers and listeners, as in a monologic approach, but rather about ‘individuals-in-dialogue-with-partners-and-contexts’ (Linell, 1998, p. 8). In the same way, an utterance should not be analysed as a stand-alone discursive element but rather as a link in the chain of communication: It is a response to preceding utterances and evokes itself as a response (Bakhtin, 1986). In other words, it is doubly contextual (Linell, 1998). Each utterance is built upon previous utterances and possesses the quality of being able to be answered in future utterances.

For the researcher, this means that an utterance taken in isolation cannot bring ‘communicatively relevant interpretation’ (Linell, 1998, p. 70). Looking at what comes before and after is crucial for assessing a participant’s understanding of a situation. When answering a previous utterance, participants are also taking into account how their response will be received and ‘how they think other people are going to respond to them’ (Wegerif, 2007, p. 18).

Another implication for research of taking a dialogic approach is the role of the researcher. When researchers analyse a dialogue, they are actively participating in it and assume the role of a third voice (Bakhtin, 1986). The understanding of a dialogue by researchers is also in itself dialogic (Wegerif, 2007). The researchers’ perspectives and their own understandings become a part of the dialogue.

3.2.3 What is learning within a dialogic approach?

Within a dialogic approach, learning means a constant negotiation of meanings. It is done together through interactions with other participants in the dialogue, either virtually or in person. Wegerif (2007) called the space where voices come together and meanings are negotiated *the dialogic space*. This space is inclusive: The perspectives of all participants, as well as outside perspectives, are included, and participants ‘mutually construct and reconstruct each other’ (Wegerif, 2007, p. 43). This process of meaning creation and negotiation is central to learning (Wegerif, 2007). Learning means being able to assume someone else’s perspective. As when Bakhtin interlinked utterances, assuming another person’s perspective means taking a position that accounts for what that person would think. Learners ‘are drawn beyond themselves by learning to see through other’s eyes’ (Wegerif, 2007, p. 52).

The dialogic space in itself is central: ‘Dialogic teaching should not aim only at the appropriation of particular voices in a debate but also the “appropriation” of the dialogical space

of the debate' (Wegerif, 2007, p. 51). Dialogue should not only be considered as a means to create more meanings, but also as an end in itself:

Dialogic education is not only concerned with the quality of what [learners] construct but, more importantly, it is concerned with the quality of the space within which they construct and with the quality of the educational dialogues through which they construct. (Wegerif, 2013, p. 5)

Wegerif's idea of dialogue as an end in itself is easier to understand when we think of the dialogic space as a physical entity in which learners encounter different perspectives. Inside the space of dialogue, learners can assume different perspectives and eventually build their own understanding of the world around them. This is consistent with the view of learning as taking another's perspective. If learning is being able to see the world through the perspectives of others, then it cannot be reduced to artefacts. The quality of dialogue could be understood as the opportunity for students to be in contact with and negotiate different perspectives.

Inside the dialogic space, playful talk and creativity are two aspects of how students construct meanings and take new perspectives. Creativity facilitates the mixing of ideas and is the default setting of a dialogic space (Wegerif, 2013). Playfulness inside a dialogic space can be expressed through, for example, nonsense talk or off-task banter. These two types of discursive elements are characterised by their playful orientation and their seeming unrelatedness to the task at hand. However, their main characteristic could be that they are present in almost all conversations children have when performing a task (Wegerif, 2007). Playfulness makes it easier to assume different perspectives. It is less difficult to put aside our own perspective and place ourselves in someone else's situation and ideas when we are playing because risk taking is minimised. If learning means taking on different perspectives, then creativity and playfulness are crucial to its facilitation.

3.2.4 What is the role of tools and technology inside a sociocultural approach?

A sociocultural approach explores the role of artefacts in mediated action; in other words, it examines how learning and meaning making are mediated by the use of tools (Wertsch, Del Río, & Alvarez, 1995). These tools can be either physical (paper and pencil) or psychological (language and signs) (Säljö, 1999). Learning is thus seen as the process by which people master the available tools in a culture and society (Wertsch, 1991).

A dialogic perspective gives an indirect role to tools and technology in learning and meaning making. Their role is not to mediate learning but to expand and deepen the space of dialogue (Wegerif, 2007). Technologies – for example, a microblogging platform – can support dialogic learning and interaction between students (Rasmussen, 2016). Although the role of tools

is more central in a sociocultural approach, this does not mean that only individuals and their mastery of tools should be emphasised. Dialogue is supported not only by available cultural artefacts but also by partners in talk-in-interaction (Linell, 1998). As Säljö (1999) put it, ‘no technology will ever replace the need for learners to participate in ongoing conversations with partners sharing interests and commitments’. However, this claim should be nuanced, as technology is rapidly developing and has already changed the way we learn and think: Artefacts help us remember and analyse information in a way that would not be possible with only our human skills (Säljö, 2016).

Computers and the internet, as artefacts combining both material and symbolic media, play a special role in supporting communication and meaning making. These web-based environments can be seen as *cultural artefacts* with social practices, concepts and knowledge embedded in their design (Furberg, 2009). The internet is intrinsically participatory and supports thinking, especially collective thinking (Wegerif, 2013). Other peoples’ exchanges, past and present, are easily accessible on the internet, enabling a shared construction of meaning: A type of co-learning not limited to participants physically present in the dialogue. The internet is a medium for linking the classroom to the outside world. Students can ‘gain access to the most recent information on whatever issue they are working on’ (Säljö, 1999, p. 144). In the language classroom, this means being able to enter into contact with a foreign language beyond what is offered by textbooks and other traditional class resources (for example, CDs, videos, or workbooks).

When it comes to developing a tool for learning, the sociocultural concepts of *artefact* and *meaning potential* can also be helpful (as elaborated on in Chapter 5). Designing an artefact involves creating meaning potentials for language learning while supporting practices conducive to learning (Säljö, 1999). The artefact provides, for example, opportunities for expanding or deepening the dialogic space. Web-based learning environments are designed with the intention of developing certain social and interactive practices; for instance, engaging in a specific community of practices (Furberg, 2009). However, the meaning potential is only actualised in interactions through the use made of it. Students reconstruct the meanings and functions of an artefact in their interactions with it: Meaning potentials can be ‘used, invoked and referred to, or misunderstood, disregarded and ignored’ (Furberg, 2009, p. 400). Students, in their interactions, can create new or unexpected uses of the artefact that differ from the design intentions (Furberg, 2009; Sykes & Reinhardt, 2012). Meaning potentials and design principles guide the development of artefacts but are only an indication of their expected use. Analysing students’

interactions while they are using the tool gives the researcher an understanding of how students make sense of the artefact and its embedded meaning potentials.

3.3 The playful frame: A conceptual framework

The previous section positioned this thesis inside a dialogic perspective and sociocultural approach while providing an understanding of dialogue and learning. To research gamification of education, we need tools to both comprehend and analyse playful situations at school. In the following section, the main theoretical concepts of this thesis are presented: play, frames and learner autonomy.

3.3.1 Play

The field of play and game studies often refers to the same main theorists when defining the concept of *play*. The two main references are *Homo Ludens*, written in 1938 by Huizinga, and *Man, Play, Games*, originally written in French by Caillois in 1961 under the title *Les Jeux et les Hommes*. These two books established the tradition of understanding play by looking at what types of activities it involves. Huizinga (1949) looked, for example, at occurrences of play in different areas of society as well as its role in the creation of cultures. Twenty years later, Caillois (2001) built upon Huizinga's work to construct his own definition, which included areas he felt were missing, such as gambling. In addition, Caillois created a system to sort play activities into four different main categories – *agôn*, *alea*, *ilinx*, *mimicry* – and along two axes, *paida* and *ludus*. This categorisation focused on the main component of each game (competition, chance, vertigo or pretend-play) and whether the game was more or less ruled and organised. However, this system can never be considered sufficiently complete or satisfying. Indeed, each new instance of play activity could be placed in one or several of the categories; new categories could also be invented to fit the new forms of play that might arise. But the core of the problem remains: What is play?

There are many issues with a traditional definition of play that limits it to what the players are doing or to the objects they are using. If playfulness resides in specific objects or activities, then they should be playful for every player. In principle, every person should find a game of chess or a game of Ludo equally playful. But this is not the case in reality: Players like different types of games. Some players might find chess playful, whereas others might find it boring. If playfulness is indeed linked to objects, then it is also difficult to explain why children can play with everyday objects that are not considered playful by most adults. If a spoon or a

stick can become playful for children, should it not be playful for adults as well? A second issue lies in the permanency of playfulness. If players find a game playful the first time around, then they should find it playful every time they are presented with it. But in reality, people get tired of games; and some days, they might not feel like playing a specific game that they just liked the day before. A definition of play that is limited to objects or activities, such as the traditional definitions offered by Huizinga or Caillois, cannot answer these questions. The question, ‘What is play?’ can only be answered by exploring how people think about what they are doing while they are playing, as well as what they are feeling.

Gregory Bateson’s theories are an interesting point of departure for understanding play in this regard. Although developed with their potential application to psychotherapy in mind, these theories are often cited in game studies (Salen & Zimmerman, 2004). According to Bateson (1972), play is a recognition of meaning. Play is seen as a form of metacommunication, which ‘reframes the events of the situation at hand, so that actions of “play” are related to, but are not the same as, other actions of “not play”’ (Salen & Zimmerman, 2004, p. 371). Metacommunicative signals have a very similar function to Goffman’s properties of a situated activity: They guide the participants’ interpretation of what is said or done in a given situation; they give instructions on how to interpret the messages they contain (Bateson, 1972, p. 193).

Thinking about play as recognition of meaning brings us closer to understanding what play is. It lies in the understanding we have of a situation and not in the objects we are using or actions we are performing. This new orientation means focusing on the player more than on the play activities. Henriot (1969) defines play as a playful attitude. His theories move the definition of play away from the play objects and towards the meaning of play. Henriot looks at the experience of playing rather than at systems of objects or game artefacts. He sees game and play as two parts of the same phenomenon, which he calls ‘*le jeu*’ (the French word for both play and game). For Henriot, ‘*le jeu* is not in the thing, but in the use made of it’ (Henriot, 1969, p. 24, translated by Philippette). Play resides in the attitude we take towards objects and situations. This statement has important implications for the understanding of gamification research. If we look at play as an attitude, we cannot possibly limit our research to game systems. If play is seen as a socially mediated activity, then the focus must be on the participants in this activity. The objects of play – the gamified application, for example – are only potentially playful: They contain elements that hint at the playability of a situation. But the decision about playfulness has to be agreed on by the participants. The focus of gamification research must be on both the

players and the whole situation. This means taking a holistic approach to playful situations or gamification.

In the FLL literature, play is said to be an important part of learning a foreign language; for example, via language play or game-based learning (GBL) (Silva, 2008; Sykes & Reinhardt, 2012). Language play, which is similar to Wegerif's playful talk, refers to a playful use of language either at a formal level, such as play with sounds or grammatical structures, or at a semantic level, such as a play with meaning (Cook, 1997). However, games in FLL often refer to small formal activities, including role play and crosswords or lexical games; ludic activities remain a filler activity in the teacher's toolbox (Silva, 2008). Even in the CEFRL (Council of Europe, 2001, p. 55) where their 'important part in language learning and development' is recognised, games are only briefly mentioned as 'the use of language for playful purposes', accompanied by a brief list of ludic activities (for example, puzzles, puns and board games). The same applies across the literature: Until recently, books on the use of games in FLL consisted of collections and lists of games without any theoretical reflection on their use, characteristics or creation (Silva, 2008).

3.3.2 Frames

In the previous section, it was established that gamification research should look at playful situations as a whole. Specific theoretical tools are required to do so, and Goffman's concept of *frame* is an interesting option. It encompasses the situation in its entirety, which is relevant when taking a holistic approach to playful situations. Through the concept of frame, all elements of a situation are taken into account: participants, contexts and artefacts. It is also specifically concerned with social interactions; and, in that way, it is coherent with a sociocultural perspective on learning that views interactions as the space of learning. Finally, it gives a more particular understanding of playful situations that can build on Henriot's theories of play as an attitude.

A frame is the interpretation we make of a situation. A. Chapman and Linderoth (2015, p. 140) defined it as 'the implicit and unspoken answer to the question "what is going on here?"'. The meaning of everything that happens in a situation and the objects present within it will change depending on how we frame it – in other words, depending on what we *think* is happening. About this, A. Chapman and Linderoth (2015) gave the example of a hand placed on a shoulder: This gesture can take on different meanings depending on whether it occurs at a dance, during a fight, or between a doctor and a patient.

A frame, also called a *membrane* in earlier works (Goffman, 1961), contains certain elements that will guide our interpretation and interactions in a situated activity. Certain behaviours, affects or characteristics are considered ‘irrelevant, out of frame, or not happening’ in a given situation (Goffman, 1961, p. 25). These rules of irrelevance define the situation and are socially accepted. Put another way, some properties of situations are excluded when engaging in a specific activity. In a game of chess, the material the pieces are made from has no bearing on the development of the game: wood, plastic and stone pieces are all used in the same way. But the different *types* of pieces do have importance and will lead to different types of interactions – a queen moves differently than a knight or a pawn. Properties of the participants may also be excluded, such as social status, wealth and age. Properties that are relevant in one frame can become irrelevant in another. The property of hierarchy, such as being an employer or an employee, is relevant in the context of an occupation, but should be irrelevant when playing a game of rugby.

The word *frame* brings to mind the idea of something fixed, solid and unchanging, such as the frame around a picture:

However, frames are not static units, given once and for all to the participants in an activity, but are constantly negotiated and upheld through interaction. During a strip of interaction, many frames can be established, frames can break down, and the participants can have different or even conflicting definitions of how to frame experiences. (A. Chapman & Linderoth, 2015, p. 141)

The concept of membrane, used in earlier works (Goffman, 1961), better represents this organic characteristic of the frame. Similar to the membrane of a cell, a frame is porous to certain elements and can be moulded to adapt to a new context.

An activity can be layered or laminated through multiple transformations (Goffman, 1974). We could think of it as adding another frame, or several frames, around the core activity or primary framework. Goffman (1974, p. 82) gave the example of ‘a description in a novel of a game of twenty-one’. There is a frame around the game activity, a layer of ‘dramatic scripting’. In the same way, a teacher lecturing about this excerpt from the novel adds an educational frame around the other frames present. Frames could thus be represented as Russian nesting dolls. Each frame alters the meaning and rules of interaction of the activity. When a frame changes the meaning of an activity, it can be called *transformational*.

The playful frame is a transformational frame. It is an additional frame layered onto a situated activity with the same properties as a membrane. What is said or done inside a playful frame will be interpreted differently. Goffman called this type of frame transformation *keying* (Goffman, 1974). Inside a playful frame, or through keying, ‘a given activity, one already

meaningful in terms of some primary framework, is transformed into something patterned on this activity but seen by the participants to be something quite else' (Goffman, 1974, pp. 43-44). When children play a game of chase, trees obtain a new meaning: They become safe places offering protection to the player in contact with them. The word *it* (as in *you're it*) also obtains a new meaning, changing a player's role from that of prey to hunter. A game activity contains many different frames at the same time: 'Players shift between these different frames when making sense of actions, utterances, and events in the gaming activity' (Linderoth, 2012, p. 4). This is particularly relevant when looking at playful situations in classroom contexts. The playful frame is opened inside the frame of the classroom and students shift from being learners to being players, lending the learning situation another interpretation and giving students a new set of possible modes of interaction. The concept of playful frame is central across the whole thesis but is especially developed in the analyses of Article #2.

3.3.3 Learner autonomy

Inside a playful frame, learners become players, and with this shift comes differences in how the roles and attributes of each participant are perceived. One of the main changes is linked to learner autonomy. Defining play as the attitude players take towards a situation means giving them the initiative to be playful. Thus, as an attitude, playfulness cannot be forced onto anyone. A situation can be made potentially playful by placing playful elements into it, but the decision to be playful comes from players. When learners become players inside the playful frame, they theoretically obtain more control over their playing, and over their learning. Players become agents of their play: They are not only in control, but have the initiative derived from it.

Games are built to give players agency or at least the illusion of it (Sykes & Reinhardt, 2012). Players need to feel sufficiently in control of the game in order to continue playing it. Sykes and Reinhardt (2012) definition of *player agency* is very close to the traditional definition of learner autonomy from the field of FLL: The ability 'to take charge of one's own learning' (Holec, 1979, p. 3). Many have defined agency as 'the opportunity, will and skill of people to act upon, influence as well as transform activities and circumstances in their lives' (e.g., Rajala, Martin, & Kumpulainen, 2016). Closely related to autonomy, agency implies a greater range of action of a person; or in this study, a student. Autonomy, especially in FLL, is delimited by a structure in which the student's action can take place: Learners take charge of their learning, but within the limits of the instructional design.

If, in FLL, learner autonomy is the preferred term, in other fields of education different concepts are used interchangeably, such as *differentiated learning* or *self-regulated learning*. In the history of the field, differentiated learning occupied a central place in the 1970s and 1980s in opposition to a type of teaching that emphasised average students (Trebbi, 2011). The concept is defined as an instructional technique that gives students tasks suited to their levels and abilities and is aimed at including all students in class activities (C. Chapman & Gregory, 2002; Hart, 2005). Also introduced in the 1970s, learner autonomy takes a different approach to classroom practices. Puren (2001) explained the difference between the two concepts by delineating who holds the decisive power. In differentiated learning, the teacher gives students different tasks; whereas in autonomous learning, students decide on their own which tasks they want to work on. This view empowers students and gives them the opportunity to take control over their own learning. Teachers become more like guides, advising students but not choosing for them. The change in the role of the teacher is an important condition for the development of learner autonomy, as is the change in a student's attitude. This is in line with a social understanding of learner autonomy, where learners are being autonomous in relation to peers and teachers in the interplay of social interaction (Kohonen, 2010; Lewis, 2014; Little, 1991; Murray, 2014). Contrarily to an individualistic understanding of learner autonomy, learners are not taken in isolation but are part of the social setting of the language classroom: they develop autonomy 'through interdependence and collaboration' (Murray, 2014, p. 6).

Learner autonomy cannot be attained if students do not have real control over their learning, and here control is understood as 'having the power to make choices and decisions and acting on them' (Huang & Benson, 2013, p. 9). Learners need to be aware, through the structure of the course or the framing of the learning situation, that they have the option to take the initiative. The creation of playful frames could be a way to develop learner autonomy through player agency.

The development of learner autonomy is one of the goals of the action-oriented approach (AOA), the current main learning paradigm of this field (Rosen, 2010). Although the Norwegian national curriculum for foreign languages does not directly use the word *autonomy*, all the components of the concept can be found in the description of the main subject area, *language learning*, which emphasises the importance of *taking responsibility for one's own learning* (K06, 2006a; Trebbi, 2011; Utdanningsdirektoratet, 2006). However, there is little empirical research on learner autonomy in the field of FLL, and even less when it comes to game-based or play-based learning. Most articles have taken a prescriptive approach to the concept, advocating for

its development in education from a theoretical point of view (Benson, 2011; Holec, 1979; Little, 2007; Miliander & Trebbi, 2008; Trebbi, 2011). For a review of empirical works linking autonomy and games in FLL, see Article #3.

3.4 The playful frame: A framework to research play situations in educational contexts

By combining a dialogic understanding of language, a sociocultural perspective to learning, and play and frame theories, we now have a complete toolkit, or theoretical framework, to analyse playful situations and students' interactions inside them.

This framework was used in both the design of the application and the analysis of the data. The application was developed following principles from the AOA. Collaboration and interaction among students were, for example, very central in the design (see Chapter 4 for an actual description of the application). The design principles of the application were directly linked to the concepts of play, frames, learner autonomy and dialogic space.

Dialogism and sociocultural theories guided the choice of data sources and analytical procedures used for this thesis. As discussed in the second part of this chapter, inside a dialogic and sociocultural perspective, analytical researchers should turn to dialogues and interactions and, more particularly, to utterances as the unit of speech communication. Video observations and interviews were selected as a way to record and access students' and teachers' interactions as well as their processes of meaning making.

Different aspects of the theoretical framework were foregrounded in each empirical study. Article #1 uses Goffman's concept of frame to analyse teachers' positioning in the narration of their experiences. The methodological choice to study teachers' interviews and video data is also linked to the importance of dialogue and interaction in dialogism and sociocultural theories. Article #2 uses the playful frame as an analytical framework to look at students' interactions among themselves and with the application. The concepts of frame, play and learner autonomy are of course central in this study. Article #3 focuses on learner autonomy as a design principle for the application as well as an analytical concept to study students' experiences of the playful learning situation. Sociocultural concepts are also central in the discussion of the development of the application in this study.

This framework is very relevant in the field of FLL research because it links theory and practice by offering theoretical tools to analyse playful situations in a classroom context. It also inspires a much needed reflection upon the use of games and playfulness in FLL that goes beyond merely listing playful activities. The playful frame fosters an understanding of the use of

gamification to create potentially playful situations and can be positioned inside the shift towards a play-based approach to gamification research (see Chapter 2). Teachers and designers can only place potentially playful elements in a learning situation to open a frame in the classroom that can then be interpreted by the students as playful. The gamified application in this research project, as an example of these elements, is presented in the next chapter.

Chapter 4: An application for playful learning

This thesis investigates the use of gamification for FLL in a classroom context. In order to do so, a gamified application was developed. The present chapter describes the final application and its different functions, as used in the classroom during fieldwork. The aim of the chapter is to give the reader a complete understanding of the instructional design. A description of the design process and a more systematic discussion of design choices are presented in Chapter 5.

4.1 General description of the instructional design

The application was developed to be very flexible and open to the insertion of different types of pedagogical content. A gamified structure was developed for the application that consists of a series of quests and tasks created and managed by a teacher. In this research project, the content was adapted to FLL, and more precisely, to French-as-a-foreign-language classes. However, the same application could be used with pedagogical content developed for other subjects, such as history, science or other languages. The application was designed as an additional resource for teachers, and it is up to the teacher to decide how this new resource will be integrated in his or her lesson plan. The teachers from this project decided at the start of the year to use the application for around one hour per week.

The web-based application can be accessed in a web browser via multiple devices: computers, mobile phones or tablets. Teachers can connect to the administrator page, where they can manage their classrooms, tasks and badges. Students connect to the application using their Facebook IDs. Their profile pictures and names appear on the application. When they log on for the first time, they are asked to join a classroom, and then a group. The students are placed in teams of three to four. On the application, students solve tasks, earn badges, exchange messages and follow their team's progress. Each of these specific functions is described in more detail below.

The application could be summarised as a task manager with an integrated microblogging platform. However, this summary would overlook an important part of the design: its gamified structure. While similar microblogging services already exist and have been used in the classroom (Hattem, 2014; Perifanou, 2009; Rasmussen, 2016), they have rarely offered the possibility of playful interpretation. By setting different pedagogical activities within the same gamified space and delimited period of the lesson – in other words, by opening a playful frame – the application becomes potentially playful.

4.2 Message board: *Activités*

Students and teachers can share short messages and links on the message board. This page is designed as a microblogging service (for example, Twitter): Messages are kept short, and they are displayed in a thread with the most recent message on the top of the page. Sharing short and informal messages is not as daunting a task as writing a whole blog post in a foreign language. The use of microblogging in the classroom can thus have a positive effect on collaboration and students' participation, where even shy students can become active members of the learning community (Perifanou, 2009; Rasmussen, 2016). Microblogging can also encourage language play, which is an important part of learning a foreign language (Hattem, 2014). The informal format of microblogging and its relaxed interactional norms cultivates a more creative use of language and risk taking that culminates in the development of language play (Hattem, 2014).

Links are symbolised through the use of the infinity symbol (Figure 1). Clicking on a message that contains a link will open the linked webpage in a new tab on the browser. The writing symbol on the top right edge of the screen leads to a composition page where users can write messages and attach links. This button is always displayed, even when the user is on a different page of the application. The user's profile picture and name are represented next to their message to facilitate the identification of the author of a post. Some messages are notifications from the application itself, such as badges received or quests completed.

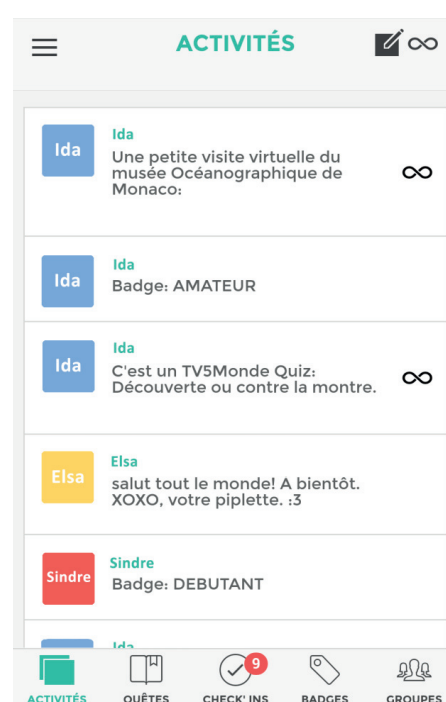


Figure 1. Screenshot from the message board page, 'Activités'.

4.3 Quests: *Quêtes*

A quest is a group of tasks focused on the development of language competence or a specific topic (see Table 1) that are solved collaboratively by each team of students. When opening the Quest page, the user first sees a list of all the quests on the application. Completed quests are marked with a check symbol, ongoing quests have an arrow, and locked quests are symbolised by a padlock (Figure 2). Clicking on an available quest will open it, and the different levels will be displayed. A quest is always open on the ongoing level. Previous completed levels can be

accessed through the tabs, and locked levels are marked with a padlock (Figure 2). A progress bar displays each group's task completion status for the current level.

The structure of the quests follows a classic game structure, with different quests divided into levels, each containing several tasks. Only one quest is available at the start of the semester. The first level of this quest is easy and fast to complete; its focus is on the creation of the blog and the choice of its settings. This level is quick to solve on purpose: It is a hidden tutorial. By completing it, students unlock two new quests and thus obtain an understanding of the underlying principles of the application's structure – completing tasks unlocks new material. Throughout the year, students can progressively unlock a greater number of quests according to their learning pace: The more they play, the more expertise they develop using the application, which in turn results in more quests to choose from. This format lets students create their own learning paths and is based on the game's structure, especially in role-playing games (RPG) or adventure games. Games

'provide multiple routes to success, allowing students to choose their own sub-goals within the larger task' (Lee 2011, p. 3). In the classic adventure game series Zelda, the final goal is to defeat the 'main boss'. This task is challenging and requires players to learn fighting tricks and develop experience controlling the character.

Players encounter many

intermediary goals and steps before they can reach the main boss. All of these different levels serve to prepare players for the final boss battle, just like the structure of quests in the application divides bigger tasks into several smaller tasks. In this manner, the player is not given all of the information at the same time at the beginning of the game, but receives it 'in small "chunks" a little bit at a time' (Kapp, 2012, p. 67).

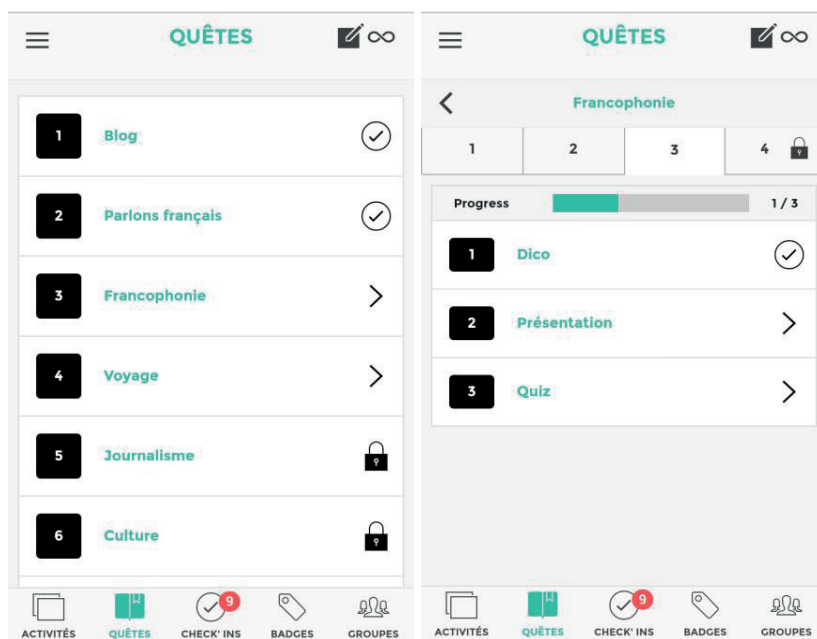


Figure 2. Screenshot from the quest page, 'Quêtes', and from the level structure inside the quest, 'Francophonie'.

Each quest focuses on one theme or one competence from the curriculum; for example, writing an article, communicating in the foreign language, or learning about the foreign language culture (see Table 1). The tasks are often very open and can be solved in many different ways according to each student’s interests and level of creativity. If, for instance, one task asks them to present information gathered in a previous level, students can write an article, make a video or podcast, or even create a quiz.

Quest	Title	Topic
1	<i>Blog</i>	This quest’s final goal is for students to write an article on a topic of their choice. Sub-goals guide the students through the process of writing an article, including finding information, reflecting on the text structure, and so on.
2	<i>Parlons français!</i>	In this quest, students review basic communication skills in French. Its final goal is to prepare the students for their trip to France.
3	<i>Francophonie</i>	In this quest, students select a francophone country, discover information about it, and share it with the other students. The final goal is to learn about francophone countries.
4	<i>Voyage</i>	This quest is meant to be solved during the trip to France. Students encounter many different challenges linked to the basic communication skills reviewed in Quest 2. The final goal is to practise the language in an authentic situation.
5	<i>Journalisme</i>	Students select a current issue (social, environmental, etc.) and impersonate journalists reporting on it in whichever media they choose. The final goal is to learn how to present arguments and debate about ideas.
6	<i>Culture</i>	At each level of this quest, students explore a part of francophone culture, such as music, plastic arts and literature. For each domain, they select which artist or artwork they want to talk about. The final goal is to discover different areas of francophone culture.
7	<i>Cinéma</i>	Students select a francophone film and present it from different angles. In the last level, students act out a sequence from the film. The final goal is to learn more about francophone culture.

Table 1. Overview of the quests developed for the research project

In order to illustrate how the quests are built, a level from Quest 5 will be presented. In Quest 5, students impersonate journalists and report on a current issue of their choice. The first level of the quest is built as follows:

- Task 1: Select a current issue.
- Task 2: Gather information on the selected issue.
- Task 3: Make a list of essential facts present in the gathered information.
- Task 4: Make a summary of these essential facts (a small text, a series of pictures, a video, etc.). Post it on your blog.

The tasks of this level are chronological: They must be solved in a specific order, from Task 1 to 4. Other levels might have a more open structure where students can select which tasks they want to complete first.

4.4 Check-ins

Check-ins are individual tasks that can be solved once daily or weekly. A red dot on the Check-in icon at the bottom of the page displays the number of available check-ins at any moment (Figure 3). Once a check-in has been completed, it is locked until the next day or the next week, and the number in the dot decreases. Check-in tasks are linked to good language-learning habits: reading, speaking, writing or listening to the language; being active during the lesson; or being an active member of the learning community (see Table 2). They encourage the practice of the foreign language and relevant interactions between peers. For example, the check-in, ‘Participate in the class conversation’, invites students to be more active during the lesson; while the check-in, ‘Watch a film or a video in French’, gives them an opportunity to be in contact with the target language.

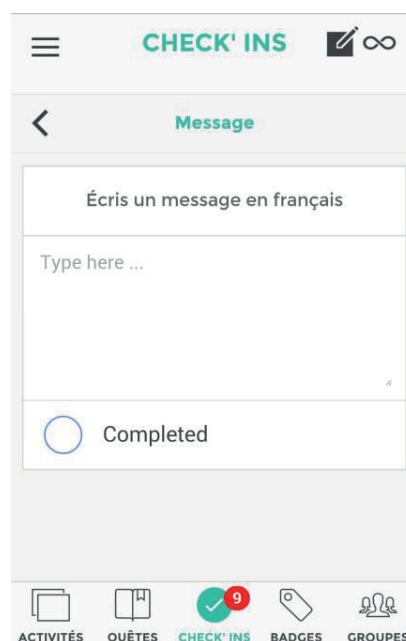


Figure 3. Screenshot from the check-in 'Message'.

Check-ins are an important part of the design for learner autonomy as they offer different types of tasks but also different types of working methods (individual or collaborative). In this way, each student can create his or her own learning path, combining group work (with the quests) and individual work, during class hours or at home.

Type	Name	Description
Daily (refreshed every day at midnight)	<i>Message</i>	Write a message in French on the application
	<i>Participe</i>	Participate in the class conversation
	<i>Commente</i>	Write a comment on another team's blog
	<i>Parle</i>	Speak only French for a whole period
Weekly (refreshed every week on Sunday night)	<i>Lecture</i>	Read a text, an article or a comic in French
	<i>Présente</i>	Present a book, film or topic on your blog
	<i>Partage</i>	Share a link in a message on the application
	<i>Quiz</i>	Create a vocabulary quiz and share it with the other teams
	<i>Regarde</i>	Watch a film or video in French

Table 2. Overview of the check-in tasks developed for the research project

4.5 Badges

On the application, badges are divided into two categories: group and personal (Figure 4). Group badges are earned by the whole team; for example, when a certain number of quest levels are marked as completed (Badges *niveau*). They are accompanied by a short descriptive title, such as ‘on your way’ or ‘impressive’. There is also a specific badge for each quest completed.

There are two types of personal badges. Some are earned according to the number of check-ins completed, with the required number of check-ins written on the badge and a short, encouraging title written below it. The other type of personal badges are awarded by the teacher and are linked to the quality of the students’ productions, participation in the class or specific skills (see Appendix 2). Badges can, for example, be awarded for posting good articles on the blog (*écrivain*), for commenting on other teams’ blogs (*commentateur*), or for helping other students (*compagnon*). When a badge is earned, a pop-up window appears on the student’s screen congratulating him or her for the achievement. A notification is published on the message board (Figure 1), and the colour of the badge changes from grey to another colour on the Badge page (Figure 4).

The inclusion of badges awarded by the teacher and focused on quality work is meant to counter-balance the automatic badges earned on task completion and awarded by the application. Badges that are focused on quantity might encourage students to hastily work through them without paying attention to the way in which they are solving the tasks. Some badge mechanics can encourage unwanted behaviours (Hakulinen et al., 2013). It is important to think carefully when creating an achievement system as well as a balanced system that does not reward one type of behaviour more than another. By rewarding a slower but more conscientious way of solving tasks, teacher badges adjust the balance

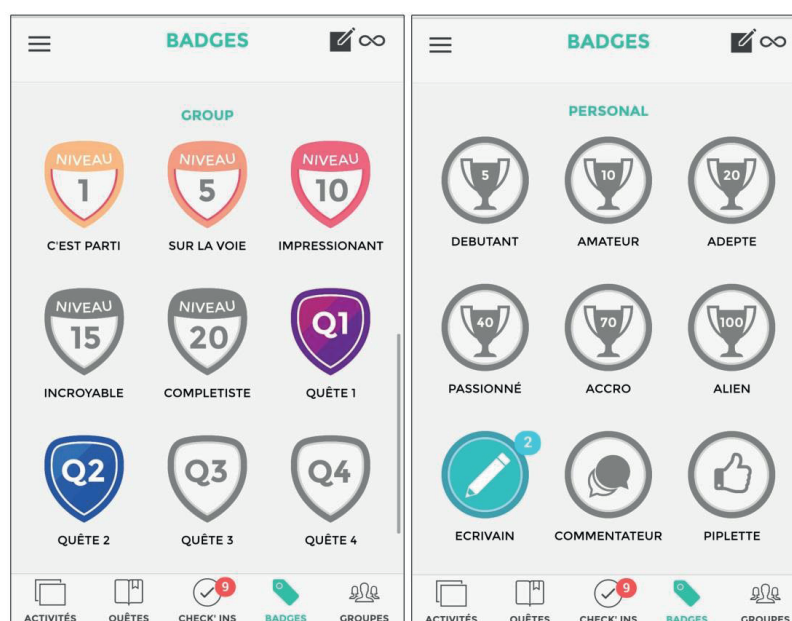


Figure 4. Screenshots from the badges page.

in the application's achievement system.

There is, however, a drawback in the design of the application in its current state. The description of badges – in other words, what should be accomplished to earn them – is not available on the Badges page. In order to solve this issue, students were given a sheet of paper on which all teacher badges were described (Appendix 2). A future iteration of the design should include these descriptions, as they are crucial for guiding the students' use of the application.

4.6 Groups: *Groupes*

On the group page, students can view the progress of each team on the application: which quests are unlocked, where the group is in each unlocked quest, and how many badges have been earned. A number next to each unlocked quest indicates the latest unlocked level (Figure 5). The progress bar shows how far in the current level a group has progressed. This system can be confusing, as at a glance, it might seem that a group will be done with a quest soon when they are in fact still in the first level. What is lost in clarity, however, is compensated for in terms of flexibility: A teacher can add levels to an existing quest at any time during the year without affecting the progress bars. There is no ranking on the application, but this page lets students compare their team progress to that of other teams. On this page, students can also see who belongs to which group and can easily access each team's blog by clicking on the infinity symbol.

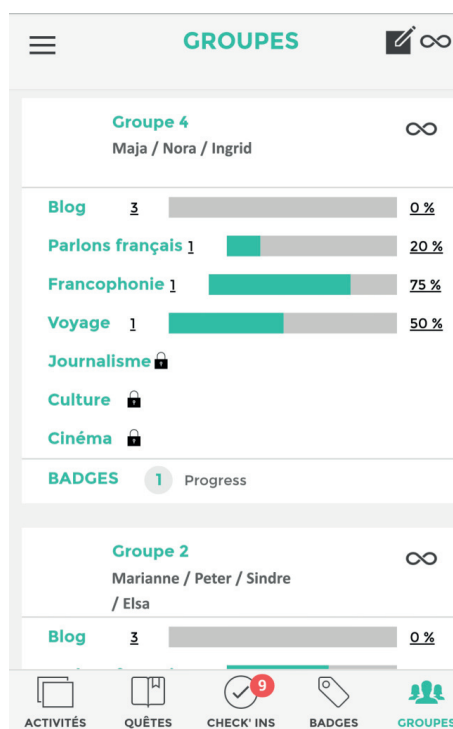


Figure 5. Screenshot of the group page 'Groupes'.

4.7 Reflections on the final prototype

The application described in this chapter is the result of several design iterations, but it could have been improved further. Its development was limited by the time and budget restrictions of a four-year doctoral project. However, specific design choices were prioritised to make the final prototype sufficient to support research and be used comfortably by both teachers and students. In the next chapter, the design process and a justification of the design choices are discussed.

Chapter 5: Design-based research and the design process

After a discussion of design-based research, this chapter turns to the design process of the application described in Chapter 4, with first a detailed description of the development of the application and its iterations, and then a section on the operationalisation of the main design principles of the digital resource.

5.1 Design-based research

Gamification, as shown in previous sections of this work, is a field still in development. The gamification of FLL is especially under-researched. Some gamified tools for FLL exist (Duolingo, Fun Easy Learn, etc.), but they are all designed for informal learning and are mostly focused on vocabulary. To study gamification and in particular its use in Norwegian high schools, a new tool had to be created. For this main reason, design-based research (DBR) was chosen.

DBR was created as a reaction to structural approaches and to address the need for new research methods in educational sciences when doing research in situ. Procedures from laboratory studies are not easily transferable to the dynamic and often disorderly context of the classroom, and thus researchers had to find other ways to conduct their studies. In order to perform research in the classroom, Brown and Collins (1992) started conducting design experiments, inspired by design sciences, where they could ‘engineer innovative educational environments and simultaneously conduct experimental studies of those innovations’ (Brown, 1992, p. 141).

A DBR project examines not only how a particular tool is designed but also how it is used in a naturalistic context. It covers the whole process, from reviewing theories and previous empirical works to designing an artefact or instructional setting, then researching its use, and finally, returning to the theories to include the new findings. This

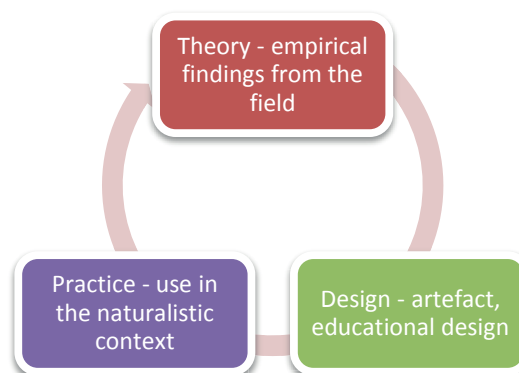


Figure 6. Cycle of iterations inside a DBR project.

process can be seen as a circular movement whereby new theories or findings inform new iterations of the design that can be tested again to contribute additional knowledge to the field. Figure 6 illustrates this circular process of iterations.

The cycle of iterations and enactments is key to a good DBR practice. The artefact or design that is developed is constantly reviewed according to field experiences and data analysis (Collins, Joseph, & Bielaczyc, 2004), which entails the creation of a series of prototypes and the use of pilot studies. But DBR does not end with the development of new educational designs; it also generates, tests and develops theories (The Design-Based Research Collective, 2003). DBR is thus a comprehensive approach to research on new practices at school that encompasses the work of both the educational designer and the researcher. Every step of the process is informed by theoretical knowledge from the research field and via experiences in the naturalistic context. The findings from a DBR project are relevant not only to the research community but also to practitioners (The Design-Based Research Collective, 2003): ‘The objectives are both pragmatic (producing innovative digital applications adapted to the teachers’ expectations) and theoretical (developing new models for instruction and learning)’ (Sanchez, Piau-Toffolon, et al., 2016, p. 485).

One challenge of this research method is that it is time-consuming. Several design iterations and tests were difficult to accommodate within a single doctoral project. The next section describes the different steps of the research design, from meetings to implementation at school. The number of design cycles was reduced to a minimum, and the first pre-tests were done internally, not as part of a pilot study. This research design made it possible to combine a short time span and several rounds of testing and improvements to the application. Nevertheless, it is clear that several iterations of testing at school would have resulted in a better design. That said, the research design used in this thesis had to be adapted to the reality, duration and format of a doctoral project involving only one researcher.

5.2 Research context and design process

In recent years, it has become more common for teachers to have a greater role in DBR projects, and researchers from this field have encouraged more involvement by teachers in various parts of the research process (Barab & Squire, 2004; Penuel, Roschelle, & Shechtman, 2007; Roschelle & Penuel, 2006; The Design-Based Research Collective, 2003). In this research project, teachers were given an important role as co-designers of the gamified application (see

Article #1). This explains why the recruitment of a volunteer school and teachers had to happen early on in the project.

An invitation to be part of the project was sent to partner schools from the university research network in November 2013 (in the first semester of the doctoral project), as the design process had to start as early as January 2014. The invitation letter outlined the main characteristics of the project and explained the conditions of participation. Two teachers answered favourably. Unfortunately, one of them had to drop out, as one condition for recruitment was that participating teachers would need to be able to teach French at the same school for two years in a row. Teachers would first participate in the design process and then teach the following year with the developed tool.

One school and one teacher, hereafter called Mari, joined the project. The school is located in a suburb of Oslo and is of medium size (around 700 students). Later in the project, a second teacher, hereafter referred to as Emilie, from the same school joined the design process (see Article #1).

5.2.1 Development of the first prototypes

The development of the application occurred in collaboration with EngageLab (UiO), with external funding from the Research Council of Norway within the frame of a FINNUT pre-project call. A design team composed of designers, a developer, a researcher and teachers was assembled:

- Main researcher on project and author of this thesis: Directed the design of the application from the research and pedagogy angle and created pedagogical content
- Senior developer: Coded the application and participated in the design
- Overall designer: Participated in the application's design
- Interaction designer: Worked on user experience and designed the application's interface
- Teachers: Gave feedback on the application's main functions and created pedagogical content

The design process underwent several rounds of iteration. After an initial review of the field of research on gamification, the main ideas undergirding the application and its future use in the classroom were developed by the author, who subsequently participated in a design workshop with Amy Jo Kim where her ideas were introduced and further developed according to Kim's design framework, 'A player's journey' (Kim, 2011). Preliminary sketches were

developed and served as a starting point for exchanging ideas about the design process during initial meetings with the rest of the team (Figure 7).

The researcher, the overall designer and the senior developer conducted a wire-framing meeting to develop an initial paper prototype. Wire framing is a design step where main parts of an application are outlined – in other

words, its skeleton – and each part is interconnected. It is usually sketched out on paper before any coding is completed. In this project, the paper prototype was used to develop user experience scenarios. In general, these scenarios model different expected interactions between the user and the application and help highlight the ergonomics and usability of the resource. In this project, three such scenarios were turned into short animated films (Figure 8), which are available on the project page on UiO's website (<http://www.uv.uio.no/iped/english/research/projects/cruaud-spilltakular/index.html>). The work on user experience revealed an interesting issue: the balance between competition and collaboration. As the focus of the project was mainly on collaboration, most of the competitive aspects present in the first sketches were removed, such as points and ranking. But competition was still central to one of the first user scenarios developed by the interaction designer. The presence of badges and teams can be interpreted as competitive, even though they are meant to display progress and foster co-learning.

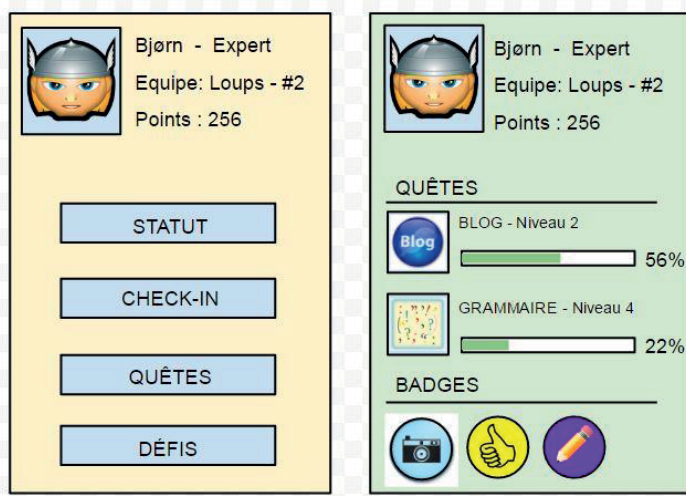


Figure 7. Preliminary sketches of the home page and profile page.



Figure 8. Screenshot from one of the scenario videos.

The paper prototype was then coded into an alpha version before being developed and improved further according to the results from the first round of internal testing. This first internal test was especially focused on finding bugs and testing the application on different devices and browsers to ensure the best compatibility possible.

5.2.2 Pre-test of the application

The new version of the prototype was then tested via pre-test. A convenience sample of four 13-year-old girls was created, each of whom were invited to the research laboratory in June 2014. The girls had not heard about the project beforehand. After a short introduction, they were divided into two teams, and each team was given a tablet or smartphone to connect to the application. The tasks and quests available during the pre-test were similar to some of the pedagogical tasks developed with the teachers, but they were adapted to accommodate the short time span of the pre-test session. They did not, for example, involve long writing tasks. There were in total three quests available during the pre-test on three different topics: music, countries and animals. There were also six individual tasks. Badges were earned for each completed quest and for finishing the first level of the first quest.

During the pre-test phase, observational data were collected to later inform the re-design of the application. The senior developer and lead researcher were present during the whole session to observe, answer questions and eliminate unexpected bugs. After the test, the four girls completed a short questionnaire focused on user experience, with questions addressing difficulties or problems encountered, ease of use and previous knowledge. Then, the researcher interviewed the participants and asked them what they had liked or disliked about the application, what they had considered confusing, and whether they would like to use the same application at their school. The girls were also asked to explain the different parts of the application to determine how much they had understood its functions. These semi-directed interviews were filmed to facilitate transcription. The data collected through observations, the questionnaire and the interviews were used to inform new improvements to the prototype and to reflect on the application's future implementation at school. The pre-test revealed that the different functions of the application would need to be clearly introduced at the start of the year to avoid any confusion, especially regarding the difference between individual and collaborative tasks.

After the pre-test, the application went into a final development phase. The badges were designed and the application received its final appearance. The administrator page that allows teachers to add their own quests to the application was also tested and finalised. In the initial

design of the application, the teacher platform was more developed. Teachers could not only create new tasks and quests, but could also follow each student and their individual progress. Information on completed tasks, earned badges and message board activity was originally intended to be easily available. This important aspect of the design had to be put aside due to the lack of time and budget constraints. Considering these limitations, the design team chose to focus on developing the students' side of the application, even though it meant losing the full breadth of the teachers' platform. This version of the application, with a simplified teacher platform, was used in Mari's and Emilie's classes for the 2014-2015 school year.

5.2.3 Reflections on the co-design process

Research on DBR has shown that it is crucial for the success of a project, not only to gain sufficient knowledge of the context of use but also to familiarise teachers with a new resource and hopefully create a sense of ownership (Hanghøj & Brund, 2010; Kenny & McDaniel, 2011; Ketelhut & Schifter, 2011; McLaughlin & Marsh, 1978; Penuel et al., 2007; Squire, MaKinster, Barnett, Luehmann, & Barab, 2003).

During the whole design process, the author acted as a bridge between the researchers' world and that of the practitioners. In the context of co-design, Penuel et al. (2007) discussed the importance of finding a common language between researchers and teachers to talk about the context, avoid conflicts and understand each other's goals. The author's background as a French teacher served as a link between the two worlds and facilitated the process of co-design. The participation of teachers in the design process was invaluable. During the seven working sessions (three sessions with Mari, then four with both teachers), Mari and Emilie provided extensive feedback on the reality of their classroom contexts and participated in the development of the pedagogical content of the application. They participated in the selection of themes for the quests according to both the curriculum and what they thought their students needed. They also created tasks and quests for the application. One quest, for example, was created to prepare the students for a trip to France. It originated from the teachers' observation that students from previous years had struggled to communicate with their host families during their week abroad. Working sessions were also used to exchange ideas about research processes and goals in the school context. These sessions were important for ensuring a good understanding of the project from both angles: research and practice.

In addition to the work sessions, preliminary observations at the school were conducted. This collaboration led to the development of a resource that could be adapted to its context of use to better facilitate its implementation.

5.3 Design principles and their operationalisation in the design

This section will review the main design principles in this DBR project and discuss how they have been operationalised in the design of the application as well as in the instructional design.

The first design principle is to *encourage playful learning*, which is the reason why a gamified structure was selected in the first place. The development of playfulness was operationalised through the creation of a separated space (Caillois, 2001; Salen & Zimmerman, 2004): The students changed places in the classroom and sat in groups. This space was also separated in time: The application was used during a specific and delimited time period of the lesson. It began when the teacher announced that the students would now work with the application, and it ended when the teacher announced that the lesson was over. The fact that they used a different tool, the application, emphasises the effect of separateness against the rest of the French period. In the design of the application itself, playfulness was operationalised through the presence of a gamified structure: quests with levels, an unlocking system, badges, progress bars and teams are all elements linked to the world of games and gamification. The quest structure can, for example, be easily linked to RPGs and adventure games. In addition, the use of specific terms, such as *quest*, *level* or *badge*, reinforces the potentially playful interpretation of the learning situation.

The design principle of *encouraging dialogue and communication* was first operationalised through the creation of specific spaces to encourage and support dialogue. The blogs with their comment section and the message board on the application are examples of these virtual spaces for communication. In the classroom, dialogue was encouraged by placing the students in teams around the same table. In addition to these spaces, the design of the application also includes several incentives to communicate. Several check-ins invite students to write messages either on the message board of the application or on their blogs; several others encourage them to share links, quizzes or information with their peers. These incentives are reinforced through the presence of badges that reward the number of check-ins completed. Among the teacher badges, two directly reward communication with peers: *commentateur* (you wrote an interesting comment) and *piplette* (you participated in the class conversation in an interesting way). Several others encourage the sharing of messages on the blogs or application

(*écrivain, photo, réalisateur* and *quiz master*). Another element was designed to encourage communication while using the application or working on the gamified tasks: the creation of a safe space. Inspired by research on dialogic writing, the blogs and message board were purposely left uncorrected by the teacher (Mahn, 2008). Students could experiment with the foreign language and write messages without the pressure to be grammatically correct. The focus was put on communication. Students could, of course, ask the teacher for help and advice when writing the messages, but they were not penalised for publishing a grammatically incorrect sentence. The focus on the form and correctness of the language was left to other lessons in the French course, whereas the work with the gamified application focused on communication and the foreign language practice.

The incentive to interact and communicate with peers as presented here is also part of a third design principle: *encouraging collaboration and co-learning*. The badge, *bon compagnon* (you actively helped other students), was one way of encouraging the students to work together on the tasks and share their knowledge and skills. The creation of teams and the associated seat assignments was also meant to encourage group work. The main operationalisation of this design principle lies in the important place given to quests – in other words collaborative tasks. They are the centre of the application and are meant to be solved as a team. Several other elements were designed to develop a sense of community and team spirit. For example, one-half of the badges are earned by whole teams instead of individual students. The group page on the application gives an overview of the progress of each team, but there is no similar page for individual students. The blogs are also linked to whole teams, becoming dedicated spaces for each group.

Finally, the last design principle is to *encourage the development of learner autonomy* by permitting students to take charge of their own learning. This design principle is operationalised through the gamified structure of the application, which offers students the opportunity to make decisions in many different areas. Students can, for example, choose which working method they want to use: individual or collaborative. They can choose which type of tasks to work on and how they want to solve them. They can also write articles, record videos, take photos, and so on. In several quests, students are free to choose which topic they want to work on as well. In Quest 1, for instance, they can choose any topic they are interested in. Finally, they can also choose where and when they want to use the application. Even though the expectation is that they would work on the gamified tasks during the French period under the teacher's supervision, the application is always available, giving them the opportunity to complete tasks at any time. A

more elaborate description of how learner autonomy was operationalised in the design of the application can be found in Article #3.

The design principles presented in this section create *meaning potentials* in the language classroom aimed at supporting specific learning practices (see Chapter 3). However, they are only actualised in practice; therefore, how students and teachers make use of the different functions of the application should be investigated in detail. The following chapter provides a detailed account of the data collection and analysis processes, as well as a reflection on the issue of research credibility.

Chapter 6: Methods

The previous chapter presented the research context and the design process of this DBR study. This chapter continues the description of the methodological procedures in this project by providing a discussion of data collection and analysis. The analysis of video data and interviews is detailed in the following sections and is completed in the appendices (see Appendices 4 and 5). Finally, issues of research credibility and ethical considerations are reviewed.

6.1 Participants

Two teachers and 13 students participated in this research project. They are presented in the following section.

6.1.1 Teachers

Mari was the first teacher to join the project. At the start of the research period, she had been a teacher for nine years. Originally a Norwegian literature teacher, she began teaching French in the years before the project. Mari is Norwegian and has learned French as a second foreign language. She had already been using ICT in her teaching, mostly in the form of videos and websites linked to the textbook. She chose to participate in the project in order to learn new ways of teaching French as well as to reflect on her own practice.

Emilie joined the research project during the design process. She has taught French in Norway for the last nine years. Unlike Mari, French is Emilie's first language, while Norwegian is her second language. Before the project, Emilie had limited experience using ICT in the classroom and thus thought that participating would be a productive way of integrating new technologies in her teaching.

6.1.2 Students

Student data were collected in Mari's class, which is the second year of upper-secondary school (VG2 in the Norwegian system) and includes students who are 16 to 17 years old. In the previous academic year, Mari taught French to the same students. Thus, they all knew each other and were informed of the project before the summer break.

According to Mari, the students comprised a pleasant group who usually followed instructions and were quite easy to manage. Their competence level in French was more or less

normal for their school year, with some variation between students in terms of low to high grades.

The class was composed of 13 students and was divided into four teams:

<i>Team</i>	<i>Students</i>
<i>Group 1</i>	<i>Erik, Jonas, Sara</i>
<i>Group 2</i>	<i>Elsa, Marianne, Pete, Sindre</i>
<i>Group 3</i>	<i>Ida, Jan, Julie</i>
<i>Group 4</i>	<i>Nora, Maja, Ingrid</i>

Table 3. Composition of the four teams

The composition of the groups was partly decided by the students and partly by Mari. Some students asked to work together. Other students did not have a preference and joined the group Mari assigned them to. Each group was composed of three or four students of varying competence in French.

Although all of the students were part of the research project, only two groups (1 and 2) were selected for the video data collection. The groups were selected after a preliminary period of observation in the classroom from August to mid-September 2014. Some interesting patterns among the groups and students were identified. Group 1 was selected because it was interesting to see how they would manage to collaborate together: Erik and Jonas formed a tightly knit workgroup, while Sara usually preferred to work alone. Group 2 was selected because during the observation period, Peter appeared apprehensive about speaking in French in front of the whole class. Mari mentioned that he had trouble with pronunciation. Sindre was not very interested in learning French, while Elsa seemed interested but was also easily distracted. The selection of these groups was also influenced by the recommendations of the teacher. One group, for example, was not considered for this type of data collection after the teacher remarked that one of its student was having a difficult year and would likely suffer under increased attention.

6.2 Data collection

The data collection lasted for a whole school year, from August 2014 to June 2015, in order to follow the development of the students and transcend the first phase of novelty. Several types of data were collected to provide a broad overview of the use of the application. Appendix 3 presents an outline of the collection of the different sources of data.

6.2.1 Video data

Video data of the two selected groups were collected from September 2014 to May 2015. Two cameras were used for the collection. Each camera was placed on a tripod and aimed at one of the groups. The cameras filmed the table and the students sitting around it, as shown in Figure 9. Table microphones were used to record the students' conversations. Sometimes, the camera angle had to be adjusted during the session in order to follow the movements of the students, but most of the time they would stand unattended to and the researcher would sit in the back of the classroom.

In total, 15 hours of video were collected as the students worked with the gamified application. During some sessions, video data were not recorded for one of the two groups, for one of two reasons: an issue with the recording equipment, or the absence of all or most of the group members (see Appendix 3 – Table 1).



Figure 9. Camera position – anonymised snapshot from the video data.

Video data comprise a good record of all interactions between members of the same group; at least, all interactions within the frame of the camera's angle (Heath, Hindmarsh, & Luff, 2010). These data were used in Article #2 as the main source in order to investigate the students' use of the application, and more particularly, their interactions inside a playful frame. Video data were also used in Article #1 and #3 as contextualising data.

6.2.2 Observational data (fieldnotes)

Observational data were collected throughout the school year. A total of 15 lessons were observed in Mari's class during the data collection phase: three before the application was introduced, and 12 after. Fieldnotes were taken during these sessions about where and with whom the students sat in the classroom and on the main events happening during the lesson. These notes were used to give context to the video data and keep track of what happened outside of each camera's range (Heath et al., 2010). This proved useful when analysing the video data as it could explain some reactions or even the general mood of the students. For example, a session in which students are very unfocused can be explained by the fact that the teacher had just talked about the final examination and this is what the students had in mind at that time. As another example, a student looking outside the camera's range and making a comment unrelated to the current conversation can be linked to a student from another class waving by the door. Fieldnotes

were taken on a notebook during fieldwork and then transcribed to make them more easily searchable. In order to gather the information on each fieldwork session in a more systematic way, the fieldnotes were combined with notes taken during the review and analysis of the video data on the analysis software Nvivo. Fieldnotes were used as contextualising data in all three articles.

6.2.3 Teacher interview data

Interview data were collected throughout the entire year from both teachers (see Appendix 3 – Table 2). These short interviews were conducted right after each filmed session with the gamified application and were focused on what happened in the classroom that day and how the teachers felt about the project and the use of the application in their teaching (Penuel et al., 2007). The teachers were free to express themselves on any topic linked to the project such that the interviewer only acted as a facilitator, using prompts when the teachers did not know where to start (Brinkman & Kvale, 2015). The prompts were very general, such as ‘How did it go today in the classroom?’ or ‘How did you feel today in the classroom?’ The interviews were recorded and conducted in French. The Norwegian teacher, Mari, was fluent in French and spontaneously chose to speak this language during the interviews. Her ability to communicate was in no way restricted. In total, close to three hours of interviews were collected. Fewer interviews were collected with Emilie as she stopped using the application in her class for a few months (see Article #1). Her interviews were also generally shorter as she sometimes had not recently used the application before the fieldwork sessions and thus had no new comments to add.

The regularity of these interviews provides a good overview of each teacher’s experience using the gamified application in their teaching. Originally designed as contextualising data, the interviews were kept short. However, the content of the recordings proved very interesting and was used as main data in Article #1. In Article #2 and #3, the teachers’ interviews were used to contextualise other sources of data.

6.2.4 Student interview data

At the end of the school year, in June 2015, group interviews were conducted with the students. The interview groups were identical to the teams the students belonged to during the school year to work with the application. In total, four interviews were conducted with nine students (out of the 13 participating in the research project). The interviews were conducted at both the end of the school year and on Fridays, a time where the normal teaching schedule had been replaced by

self-directed learning periods due to exams, which explains the absence of four students during the interviews. Screenshots from the application were made available to the students to illustrate their comments and guide their narration. The interviews were semi-directed and were focused on the students' experiences using the gamified application in their learning (Brinkman & Kvale, 2015). The interviewer asked questions about each part of the application as well as the students' use of each function. Students were also asked about their work habits as a group when using the gamified tasks. The students were free to express their own comments or mention whatever topics they wished to discuss in relation to the project or the application, which explains the differences in duration between each interview (see Appendix 3 – Table 3). The interviews were conducted in Norwegian and were filmed to facilitate the transcription process by making clear who was speaking and what they were pointing at (Brinkman & Kvale, 2015).

The interviews conducted at the end of the year-long project gave students the opportunity to express their opinions and share their experiences. Students could reflect on their use of the gamified application and offer valuable feedback to inform the design of future iterations, which is an important part of a DBR project (Collins et al., 2004). These interviews were used as a primary source of data in Article #3 to investigate the students' experience of playful learning situations, particularly in relation to the development of learner autonomy. The interviews were also used in Article #2 as contextualising data.

6.2.5 Data log

Data were automatically gathered by the application from the first day of use until the end of the school year in the application's database. Time stamps were used to identify points in time where actions were realised on the application by specific users. For example, when a student marked a check-in as completed in the application, a time stamp was saved that recorded the ID of the student, the time, and the ID of the task marked as completed. A data dump was done at the end of the school year to extract all data points from the database.

The data log was used as a main source of data in Article #3, providing information on the progression of each group in the quest and on the different uses of the application's tasks by each student. The data log was crucial in the analysis of the students' emergence of learner autonomy.

6.2.6 Screenshots: Application in use and blog productions

Throughout the school year, screenshots of the application in use were taken by the author. The screenshots focused on two pages of the application: the message board and the group page. Although the messages sent through the application were collected at the end of the year in the data log, regular screenshots made the creation of a timeline much easier as all messages were displayed as they actually appeared for the students. A total of 47 screenshots were taken, approximately once per week from November 2014 to June 2015. Anonymised versions of the screenshots were used in each of the three articles as an illustration and as contextualising data.

At the end of the year, the author also collected articles posted by the students on their team blogs. Each blog was saved in the offline mode of the web browser for further reference, and screenshots of some articles were taken. A total of 89 articles were collected (see Appendix 3 – Table 4) and used as contextualising data in Article #3.

6.2.7 Summary of data collection

Data type	Collection	Amount	Use as primary source	Use as contextualising data
Video	September 2014 – May 2015	12 sessions - 15 hours	Article #2	Article #1 Article #3
Observations	August 2014 – May 2015	15 sessions		Article #1 Article #2 Article #3
Teacher interviews	September 2014 – May 2015	18 interviews – 3 hours	Article #1	Article #2 Article #3
Student interviews	June 2015	4 interviews – 2.5 hours	Article #3	Article #2
Data log	September 2014 - June 2015	-	Article #3	
Screenshot of the app	November 2014 – June 2015	47 screenshots		Article #1 Article #2 Article #3
Blog articles	June 2015	89 articles		Article #3

Table 4. Summary of data collection

6.3 Data analysis

The following sections present the analytical procedures applied to the different types of data. Interaction analysis and thematic interview analysis are particularly developed. An overview of the different coding categories can be found in Appendices 4 and 5.

6.3.1 Analysis of video data

The video sequences were analysed using the video analysis software Nvivo. All of the videos were imported into the software and processed during the first level of analysis. This level consisted of watching the videos and identifying *key events* (Derry et al., 2010). These key events comprised sequences of interactions between students (e.g., discussing a theme, asking a question) and were coded directly in the videos without undergoing transcription (see Appendix 4 – Figure 1 for an example of a coded sequence). Sequences of silence – for example, when the students were working individually on their laptops – were omitted. A total of 37 empirically derived codes were created, which were grouped into four main categories: peer interaction, organising work, difficulties and using resources. The codes represented sub-events in the sequences; for example, a student asking a question of the teacher, students discussing strategies, or students composing a piece of text together.

Once all of the videos had been initially coded, sequences were selected for transcription (Goldman, Pea, Barron, & Derry, 2007). The selections were made according to the main coding categories: guided by the different themes found in the data; and it was focused on sections of the videos containing sustained talk or talk-on-task. These sequences represent episodes of interaction; in other words, ‘units of naturally unfolding social interaction’ (Linell, 1998, p. 187). In these episodes, students accomplished a sequence of collective actions or discussed a particular theme. Although the selections were focused on these episodes, parts of the video data that were not transcribed – for example, when students were not talking at all – can still be easily identified and accessed as the videos have been coded in their entirety. The transcriptions generated in this way were then analysed on their own, independent of the first video coding. The new coding scheme, composed of 50 individual, empirically derived codes, was grouped into nine main categories, such as ‘group interaction’ (interactions within the team), ‘application’ (discussing the application and its functions) or ‘technology and tools’ (discussing something related to the tools they were using) (see Appendix 4 – Table 1 for examples from each main category). Each category represents a sub-event – a specific type of interaction (Derry et al., 2010). Such interactions can be either an action (e.g., asking a question of the teacher, under category ‘teacher interaction’), a topic in the conversation (e.g., discussing badges, under category ‘competition and game’), or an attitude (e.g., being playful or joking, under category ‘playful talk’).

The video data were then analysed according to the principles of interaction analysis, which is a video-based analytical method with roots in ethnography, socio-linguistics and

conversation analysis. Interaction analysis ‘investigates human activities, such as talk, nonverbal interaction, and the use of artefacts and technologies, identifying routine practices and problems and the resources for their solution’ (Jordan & Henderson, 1995, p. 39). Through observations of social interactions between participants, the researcher seeks patterns ‘in the ways in which participants utilize the resources of the complex social and material world of actors and objects within which they operate’ (Jordan & Henderson, 1995, p. 41).

An interaction analysis of an excerpt is usually presented in three parts. First, the researcher writes a thick description of the excerpt, presenting the settings and the situation. This is followed by the transcript of the excerpt. The depth of transcription and the relative use of transcription signs depend on the type of analysis being conducted; in other words, what is being researched (Derry et al., 2010). For instance, it is not always necessary to record the number of seconds between each turn of talk. The analysis comes after the transcription and is divided into two levels. In the first level of analysis, the researcher stays very close to the conversational action and presents in detail the different turns of talk. This could be simplified as, ‘What is happening? What is being said and by whom?’ In the second level of analysis, the researcher takes a deeper look at the interactions and tries to understand them through a theoretical lens. In Level 2, concepts from the theoretical framework are used in the analysis: for example playfulness or learner autonomy. Table 5 presents examples taken from Article #2 (Cruaud, 2016) and illustrates each step of the analysis.

<i>Thick description</i>	<i>At the start of this sequence, the two students are sitting next to each other, each with a laptop. They are discussing if they should write a song with the expressions when they start singing (Cruaud, 2016, p. 10).</i>
<i>Level 1 analysis</i>	<i>Erik seems to be a bit puzzled by what he sees on the screen (line 5). Jonas starts guiding him through the blog to find the correct post with the expressions (line 6) (Cruaud, 2016, p. 11).</i>
<i>Level 2 analysis</i>	<i>The fact that the students are discussing their options and trying to find an alternative way to present the expressions shows their control over the activity. They are not just writing a list of sentences on the blog to complete the task and follow the teacher’s instructions. They are playing with the words and with the possibilities offered by the task. We can see in Erik’s comment in line 2 (‘How do you propose we do that?’) that the two students are taking up the affordances of the activity (Cruaud, 2016, p. 11).</i>

Table 5. Example of interaction analysis

6.3.2 Analysis of teacher interview data

The interviews were transcribed and thematically analysed, with recurring themes marked (Brinkman & Kvale, 2015). This analysis revealed four main empirically derived codes: teacher’s role in the classroom, students’ familiarity with IT and the application, students’ use of

the application and teachers' use of the application, and IT resources (see Appendix 5 – Table 1). These data were used primarily in Article #1, where they were analysed through the lens of concepts from the theoretical framework. In addition, Goffman (1974, 1981) theories of footing, alignment and frame switch were specifically used in this article to study the positioning of the teachers through the analysis of cues and markers in the teachers' utterances. More details can be found on the analytical process and findings in Article #1.

6.3.3 Analysis of student interview data

Each interview was transcribed and thematically analysed using Nvivo. The researcher followed a data-driven process to code the data, which 'implies that the researcher starts out without codes and develops them through readings of the material' (Brinkman & Kvale, 2015, p. 228). This process generated a total of 178 different codes related to what the students were saying, specific expressions or feelings, or particular functions of the application. As such, this large number of codes was not easily manageable, so they were analysed and grouped according to their similarity. The codes 'collaborating' (23 references), 'sharing tasks' (12 references) and 'working individually' (13 references) were, for example, grouped under the sub-category 'organising' and the main category 'strategies'. In total, 13 empirically derived categories were created, among which were 'compare to normal class', 'competition' and 'peer interaction' (see Appendix 5 – Table 2 for a detailed overview of the main categories).

6.3.4 Analysis of data log

The raw data from the application's database were extracted as a JSON file during the data dump process. The file was converted and sorted on an Excel spreadsheet. The time stamps related to quest tasks were sorted by group, whereas the time stamps for the check-in tasks were sorted by student. In addition, each time stamp was linked to the ID of a specific task on the application, making which check-ins had been completed by each student easily identifiable. The data log also contained all of the different messages and notifications posted on the message board of the application. Through the analysis of these data, more information on each group as well as on students' activity on the application was obtained, such as how many tasks were completed and when, which quests were worked on or ignored, and so forth.

6.3.5 Analysis of blog productions

At the end of the year, the students' blog articles were collected and analysed. The focus of the analysis was on multimodality, or the use of different types of media in the students' blog posts. The presence of relative degrees of multimodality in the students' blogs illustrates their different ways of solving tasks. Each article was analysed, and the use of images, videos, links, quizzes, podcasts or texts was reported on a spreadsheet. The findings were sorted by group to make a comparison between each team easier. These data also provided an overview of how many articles were published by each team and when.

6.4 Reflections on research credibility

Credibility in qualitative research involves the issue of consistency between research methods, objects of investigation, data collected and findings (Jensen, 2012). In the following sections, the concepts of validity, reliability and generalizability in this thesis are discussed. Specific issues concerning the use of video data and the role of the researcher in a DBR project are further developed as well.

6.4.1 Validity

In qualitative research, validity is defined as 'whether a method investigates what it purports to investigate' (Brinkman & Kvale, 2015, p. 282). Put differently, questioning the validity of a study means asking whether the research methods used are trustworthy. It implies a continuous quality check at each step of the research process (Brinkman & Kvale, 2015). As a researcher, one must constantly reflect on his or her choices, either in a research journal during the design process or when consulting with fellow researchers. Such reflections and an honest account of the author's choices, as presented in this extended abstract or to some extent in the empirical studies, strengthen the validity of the project.

Specific choices were also made to ensure that the methods used would investigate what they were intended to investigate. For example, the fieldwork period was extended to a whole school year to obtain access to how students were really using the application, beyond the potential novelty effect. In a research design with a shorter period of classroom observation, the data collected might be influenced by the excitement of using a new resource. These data would thus be different from data about students' use of the application once they were familiar with it.

Creswell and Miller (2000) emphasised that doing fieldwork over a longer period of time with the same participants adds validity to a qualitative research study and strengthens its findings.

The validity of a study is also defined in terms of whether the findings are correctly interpreted (Miller, 2012b). The research design used in this study includes several sources of data in order to evaluate the learning situation from different angles. The author's interpretation of the video data can be validated by the content of the students' interviews, and was thus constantly assessed against the students' own descriptions of their experiences using the gamified application. Validation through the participants' lens reinforces the credibility and accuracy of the researcher's interpretation of what happened in the learning situation (Creswell & Miller, 2000).

6.4.2 Reliability

Reliability, within a qualitative approach, has often been contested, and some researchers have preferred to use other terms, such as *trustworthiness* (Cohen, Manion, & Morrison, 2007). Reliability is often defined as 'the consistency and trustworthiness of research findings' (Brinkman & Kvale, 2015, p. 281). This does not mean, as in a quantitative approach, that different researchers will necessarily arrive at the same findings were they to analyse the same piece of data. Indeed, in qualitative research, there might be as many interpretations as there are researchers (Brinkman & Kvale, 2015). However, reliability does mean that a certain level of stability in terms of observation is attained and that the results can be found credible by other members of the research community. During the author's fellowship, numerous seminars, organised by either the national doctoral school (NATED), different research groups or during courses, were attended, where the author presented and discussed transcripts and interpretations with other researchers. These multiple instances of peer-review reinforced the reliability of the author's own interpretations as the trustworthiness of the findings was strengthened.

The reliability of a study also depends on a rigorous and credible documentation of research processes (Creswell, 2014). Ensuring that the whole research process is transparent is a common strategy for guaranteeing better reliability in a qualitative research project (Miller, 2012a). In this thesis, the applied research design and the issues that arose during the research period have been described at length. In this way, other researchers can follow each step taken during this project and judge its credibility for themselves. The use of video and audio recording in the data collection process was also a guarantee of quality, as other researchers can inspect the data sequences and transcripts (Derry et al., 2010; Goldman et al., 2007). In this fieldwork, HD

cameras and table microphones were used in order to capture the students' conversations and interactions in the most detailed way possible. Teacher interviews were audio recorded to facilitate transcription and to avoid the loss of data and the subjectivity of memory (Brinkman & Kvale, 2015). Student interviews were filmed to make the transcriptions more trustworthy, as doing so made it easier to identify who was talking; video also added another dimension to the transcript, as it captured students' gestures. This last point was particularly interesting in regard to where the students were pointing on the application's screenshots, as it helped to avoid misunderstandings during transcription.

Reliability can also be interpreted as the level of fit between the data collected and what happened in the field (Cohen et al., 2007). In this research design, different types of data were collected to ensure that the learning situation was represented from different angles. In this way, the data collected more comprehensively covered the events which happened in the classroom, thus ensuring the greater reliability of the study.

6.4.3 Generalizability

Qualitative educational research, with small sample sizes and disorderly classroom contexts, cannot be generalised in the same way as quantitative research; instead, it should focus on the question: 'Why will the knowledge of a single or limited number of cases be useful to people who operate in other, potentially different situations?' (Donmoyer, 2012, p. 372). This reflection of the researcher on the extent to which the findings from one study can be useful in another study is referred to as *analytical generalisation* (Brinkman & Kvale, 2015). In order for the reader to find similarities between two situations, the researcher must provide rich descriptions of the research settings, procedures and findings. Such descriptions were provided in this thesis and accompanying empirical studies.

Maxwell (2014) differentiated two different types of generalisation in qualitative studies: *internal generalisation* and *generalisation of processes*. Internal generalisation refers to the arguments made by the qualitative researcher to show that the findings observed for some participants can be transferred to other participants in the same study. It is the duty of the researcher to show that the sequences or events presented in the analysis have not been 'cherry-picked' but rather represent a recurrent event in the data collected. Through a clear account of the selection process of the participants and sequences and a thick description of the analytical process augmented with examples of coding categories, the author hopes to have achieved a credible and trustworthy research presentation. When it comes to the generalisation of processes,

which refers to the transferability of theories to different contexts (Maxwell, 2014), it is necessary to turn again to the conceptual framework developed in this thesis. One of the aims of this framework was to provide theoretical tools to researchers in the analysis of playful situations in FLL contexts. Thus, it is in this way an example of generalisation of processes.

Finally, there is another type of generalisation, also presented by Maxwell (2014), worth noting: *face generalisation*. If the qualitative research is presented in a credible and trustworthy fashion, then there is ‘no obvious reason *not* to believe that the results apply more generally’ (Maxwell, 2014, p. 138).

6.4.4 Specific issues and challenges with video data research

There are some issues and challenges regarding the use of cameras in data collection. Even though a video might seem to represent reality objectively, it nonetheless remains merely a representation of it: ‘a version of an event as it happens’ (Heath et al., 2010, p. 5). The researcher is ‘dealing with a transformation of that world and not simply with an objective, faithful representation’ (Jordan & Henderson, 1995, p. 53). Moreover, video is only one chosen angle on a life event; there will always be some elements omitted from the film. The choice of camera angles, and the number and placement of the cameras used, will influence the quality and amount of data collected from an interaction. As can be seen in Figure 9, the camera ignores anything happening outside of its lens. Pointing a camera means making a choice about what will be focused on and what will be ignored. The use of fieldwork observations during the filming sessions to some extent compensates for this loss.

It is also easy to argue that omissions are less important in the use of videotaping than in field notes or other written observations. The camera can capture a larger amount of detail, especially simultaneous and complex interactions: ‘Even a trained observer cannot keep track of the overlapping activities of several persons with any accuracy’ (Jordan & Henderson, 1995, p. 52). Further, ‘Video technologies provide researchers with powerful “microscopes” that greatly increase the interactional detail that can be obtained’ (Derry et al., 2010, p. 6).

Another issue is knowing whether the presence of cameras disturbs the interactions the researcher wants to observe. This author agrees that cameras have an effect on teachers and students. It is difficult to completely ignore the presence of two cameras planted on tall tripods in-between tables. In the video data collected, students can be seen regularly pointing at the cameras, making comments on what the researcher will hear and see, and even sometimes playing with the table microphone. The cameras are undeniably noticed by the students,

especially during moments when they are not very focused on their work. But at the same time, the students still discuss their tasks, working on them and going about what they would usually be doing in class. As a researcher, one must accept that his or her presence and the tools that are used to collect data will have an effect. Nonetheless, video recording remains the best way to access the information needed about student interactions. The collection of video recordings made it possible to access details about social actions, as well as details about the patterns of use and challenges encountered by the students (Heath et al., 2010).

6.4.5 The role of the researcher in design-based research projects

Challenges also exist with respect to the use of design-based research (DBR). The main issue, especially in such a small-scale project, is the dual role of researcher and designer. As a designer, the author had to create a tool and ensure its successful implementation in the classroom. As a researcher, the author had to objectively analyse the results of this implementation. In DBR, ‘researchers regularly find themselves in the dual intellectual roles of advocate and critic’ (The Design-Based Research Collective, 2003, p. 7). This dual role was made easier by the fact that the success of the application in itself was not being researched, but rather the uses students made of it. There was no risk of being partial as the author was interested in the learning situation created by the application and its affordances, not the efficiency of the application compared to other resources. In addition, the collection of many different types of data from the same learning situation ensured the validity of the research. Indeed, ‘design-based research typically triangulates multiple sources and kinds of data to connect intended and unintended outcomes to processes of enactment’ (The Design-Based Research Collective, 2003, p. 7).

Yet, this dual role might have affected how the author was perceived as a researcher by the students and teachers, especially during the interviews (Brinkman & Kvale, 2015; The Design-Based Research Collective, 2003). The fact that the same researcher developed the app, sat in the class for a year, and conducted the interviews might have influenced what the students said or how they said it. They might have felt hesitant to criticise the application or admit not using one or more functions in front of the person who developed it. Thus, the author decided that the best way to give the students room to express negative feelings and talk about their experiences freely was to empower them and also embody the dual role. The group interviews with the students had two main goals: to learn about their experiences, and to improve the application. It was made clear to the students that their help was needed in order to know what should be changed and what should be retained in future iterations. In the interviews, the

students seemed to talk quite freely about the application and their use of it, telling the author what did not work, what they liked, and any criticisms they had of the whole experience.

The same question could be asked in regard to the teachers' interviews: 'Has the dual role of the researcher affected what the teachers said?' Talking with the designer of the application, the teachers may have only wanted to focus on positive aspects, not mentioning what they really thought about using the application in their classrooms. Emilie, for example, was always very positive about the application, even when she stopped using it for a few months. On the other hand, as co-designers of the resource, the teachers were actively involved in the project; they were more than simple participants. This level of involvement can be seen in Mari's interviews, where she often regarded herself as part of the design team (see Article #1). Interviewing the teachers was a natural continuation of the dialogue started during the co-design process. The collaboration did not stop when the application was implemented; rather, their feedback was an important part of the cycle of iterations and enactments during the entire project (Roschelle & Penuel, 2006).

Even though collecting interview data has some limitations, especially inside a DBR project, it is nonetheless a good way to give voice to the participants (Brinkman & Kvale, 2015). It was especially important to hear what the students had to say about their experiences, as this is uncommon in gamification research. Most research on gamification involves quantitative studies with a strong behaviouristic component: Students are unspecified research subjects, while the main focus is on the artefact (Sanchez, Piau-Toffolon, et al., 2016). By collecting data from many different sources (data logs, interviews, video, etc.) a richer and more complex description of the learning situation when a gamified system is used was created that surpassed the perspective of the designer.

6.5 Ethical considerations

This research project was approved by the Norwegian Centre for Research Data (NSD) and followed the recommendations of the National Committee for Research Ethics in the Social Sciences and the Humanities in Norway (NESH). It was crucial to respect two basic principles of research ethics: free and informed participation in research, and the anonymity of participants. All participants were given clear and detailed information on what their participation would entail and filled out a consent agreement. It was made clear that they were free to withdraw their consent at any time and without any consequences. All of the data collected in this project were

stored on an encrypted and password-protected hard disk, with access restricted to the main researcher.

There were three main ethical issues with this project that had to be addressed. The first issue was what happened to the students who did not want to participate in the study. As it was the teacher's choice to use the digital tool as a complement to her teaching, all of the students used it during the language course, as they would any other tool, activity or exercise provided by the teacher. The students were free to participate in or decline to be a part of the research, and they could withdraw their consent at any time. Any student who did not want to participate in the study did not become a research subject. They did not appear in the videos, nor were they interviewed. To facilitate the filming procedures and make the situation more comfortable for both teachers and students, it was decided before the start of the school year that any student who did not want to be filmed would be grouped into one class. This meant that the research was only conducted in one of the two classes using the application, and no video data were collected in the second class.

The second main ethical issue was linked to the use of video data and anonymization. It is a challenge to anonymise video data, but it is not impossible. Generally speaking, faces can be blurred or still images from the videos can be turned into sketches or cartoons (Heath et al., 2010, p. 30). Figure 9 demonstrates an example of the anonymization of still images from the video data. In this research project, video data did not need to be directly anonymised as only the main researcher had access to the original footage. All transcripts and documents (e.g., screenshots from the application) were anonymised with the use of pseudonyms and all personal information that could help identify the participants was removed.

Lastly, there was the potential ethical issue of using Facebook IDs to log on to the application. During the preliminary observation period of the design process, it was confirmed that all students from the observed classroom already had a Facebook account so that no one would have to create one especially for the research project. The application only accessed the profile pictures and names of the students: no other information or content was retrieved. The use of the Facebook ID simplified and shortened the development process as the developer did not have to create a specific database, freeing up more time and money for developing a solid prototype for research and use in the classroom. The three empirical studies investigating the application and its use by teachers and students are presented in the next chapter, alongside the contributions of this thesis to research.

Chapter 7: Summary of the studies and discussion

This chapter first presents the three empirical studies comprising this thesis as well as their findings. Each study analysed playful situations from a different angle within the conceptual framework developed in Chapter 3: the playful frame. Article #1 examined teachers as co-designers who help set up a playful frame in the classroom, and more particularly, how they experienced the use of a gamified application in their teaching, including its difficulties and their perceptions of their role. The next two articles focused on students and their interactions inside the playful frame, either in relation to playfulness (Article #2) or autonomy (Article #3), but always with the emphasis placed on students' perceptions of the use of a gamified system in their learning.

Following the summary of the three studies, the empirical, theoretical and methodological contributions of this thesis to research will be discussed with respect to the overarching research questions presented in Chapter 1.

7.1 Article #1

Cruaud, C. (under review). Designing with teachers: Contrasting teachers' experiences of the implementation of a gamified application for foreign language learners.

This book chapter investigates teachers' experiences of the implementation of the gamified application in their classrooms, particularly through the lens of their involvement in the design process. The study contrasts the experience of Mari and Emilie, the two teachers who participated in the research project and used the application for one school year in their French classes. Interview data collected regularly throughout the school year with the two teachers was used to answer the following research questions:

- How did the teachers experience the implementation of a gamified application in their classrooms?
- In what way is the teachers' involvement in the design process reflected in their experience and in the account of their experience?

A thematic analysis of the teachers' interviews was conducted to study their experiences of the implementation and use of the gamified application via their own narratives and perceptions. Recurring, empirically derived themes were identified in the interviews, as developed in Chapter 6 (see also Appendix 5). Goffman (1974, 1981) concepts of frame, footing and alignment were used to analyse the teachers' positioning in the interviews. The positioning,

or alignment, of the participants was made visible through the use of linguistic cues in their narration (e.g., the use of specific words or pronouns). In addition to interviews, video observation data was used to further deepen the analysis of the first teacher, Mari. Through the study of some excerpts of interactions with groups of students and field notes from the author's in-situ observations, a more detailed image of her classroom experience was depicted.

The analysis revealed that the teachers experienced the implementation and use of the gamified resource – in other words, the presence of the playful frame – in very different ways. While Mari, the first teacher, had a positive experience and was active in her use of the application, Emilie experienced the implementation of the new resource as negative and interpreted it as a loss of control. Three main categories were identified in the analysis of their narrations: teachers' training and participation, teachers' familiarity with the resource, and perception of the teachers' role.

Both teachers participated in the design process of the gamified application as well as in multiple training sessions. However, when Emilie, the second teacher, joined the design process, the main design phase of the application had already been completed. In Article #1, it is argued that her diminished involvement in the design process might have been one of the reasons for her negative experience. She felt lost in the classroom when the students were using the application, which might also be a sign that the content of the training sessions needs to be modified. The discussion of these issues is particularly important in the context of future iterations of the project or with respect to the use of the same application by teachers who did not participate in the design process.

The analysis also revealed that the teachers' narration reflected different levels of confidence and familiarity with the gamified application. Mari expressed clear ownership of the resource, which she freely adapted to new situations and different students. The author discussed her experience via the concept of *re-designer* (Squire et al., 2003). Emilie, despite demonstrating a positive attitude towards the project, stopped using the application in her classroom. She also expressed the need for more guidance in her classroom, a sign of a lack of confidence regarding the application.

Finally, in this study, it was determined that the teachers perceived their roles in different ways. This difference was made visible through the analysis of their positioning. Mari clearly positioned herself as a member of the design team and described her role in the classroom as active. Emilie's account of her experience in the classroom can be understood via the concept of *sense of efficacy* (Ketelhut & Schifter, 2011; McLaughlin & Marsh, 1978). Emilie's sense of

efficacy was low, and she described her role as passive. In this study, it is argued that her lack of experience with new technologies might have played a role in her negative experience.

In Article #1, it was found that involving teachers in the design process has advantages, as shown in the positive experience of Mari. However, other factors play an important role in the potential success of a new digital resource. A teacher's attitude towards technology and his or her confidence regarding computer skills are crucial elements for successful implementation. By contrasting two experiences, this study raised the important issue of teachers' involvement in the design process, while providing a detailed account of both positive and negative elements that can arise in the implementation of a digital gamified application.

7.2 Article #2

Cruaud, C. (2016). The playful frame: Gamification in a French-as-a-foreign-language class. *Innovation in Language Learning and Teaching*.

Article #2 explored what happens in the classroom when a gamified application is introduced. This article evaluated two essential moments in the experience of gamification: *setting up a playful frame* and *interactions inside the playful frame*. How the instructional design and the design of the application was intended to create a playful frame in the classroom was first discussed, followed by an examination of students' interactions while using the gamified tasks.

In order to theorise the presence of the playful frame in the classroom, Henriot (1969) concept of play as an attitude, also developed in Chapter 3, was used. This perspective on play emphasises the importance of looking at the students' use of gamification instead of focusing only on the artefacts and their design. Silva (2008) four dimensions of play, based on Henriot's understanding of playfulness, were deployed as an analytical framework to research the creation of a playful frame in a classroom context and students' perception of it. In her framework, Silva described the first three dimensions as *playful objects*, *playful structures* and *playful context*, each of which comprise elements that teachers can influence to create potentially playful learning situations. The last dimension, *playful attitude*, can only be achieved by students: It is linked to their perception of the learning situation *as* playful. Although teachers can prepare a playful frame by using the elements present in the first three dimensions, they cannot force students to enter it. Playfulness represents the choice of a player with a specific attitude towards the situation and also serves as a sign of his or her control over their learning.

To look into the students' experience of the gamified tasks and whether they entered the playful frame as designed by the teacher, an interaction analysis of video data sequences of two groups of students was conducted. The data collection and analytical processes have already been detailed in Chapter 6 (see also Appendices 3 and 4). In Article #2, the analysis was focused on two sub-events: *friendly competition* and *organising the tasks*. The two selected sequences were representative of the types of sub-events that occurred repeatedly in the video data of both groups. Through the analysis of these sequences, contextualised with interview data, the study assessed *how the students engaged with the gamified application and how the design intentions were enacted in the classroom*. In order to do so, the following research questions were investigated:

- How are the students expressing playfulness?
- In which ways are they showing autonomy?

In this study, it was found that the students did enter the playful frame designed by the teacher; in other words, they were playful. They assumed a playful attitude towards the gamified activities by, for example, engaging in friendly competition, language play and playful talk. This interpretation of the sequences was validated by the interview data, in which students frequently stated how 'fun' it was to work with the application.

It was also determined that the structure of the application gave students control over the learning activities. In the data, students made choices, discussing the tasks and alternatives for solving them. They not only solved the tasks in a straightforward fashion but played with the possibilities offered by the application. Students adapted the learning activities to their own interests, such as when they created additional tasks in order to compete for a new badge. In their adaptation of the gamified tasks, they were playful and expressed their autonomy.

In this study, it was also revealed that the playfulness and autonomy expressed by the students served as an indication of their level of engagement in the tasks. Their engagement was visible in their choice to create and solve additional tasks and in their attitude towards the learning activities as a whole. In the interviews, they repeatedly mentioned feeling autonomous in their management of the tasks and being motivated by having greater control over their learning paths.

The findings of this study show promise for the development and use of gamification in foreign language learning, particularly when it comes to students' engagement and autonomy. The framework introduced in this article and developed in this thesis offers new insights on gamification research from the perspectives of students.

7.3 Article #3

Cruaud, C. (in press). Learner autonomy and playful learning: Students' experience of a gamified application for French as a foreign language. *ALSIC (Language Learning and Information and Communication Systems)*.

Article #3 aimed to examine the development of learner autonomy in relation to the use of gamification in the empirical context of the foreign language classroom. This study took as a starting point several theoretical assumptions from the field of FLL on learner autonomy and game-based learning. Although these assumptions about the relation between play, FLL and learner autonomy are generally positive, few studies have researched these themes empirically. Article #3 illustrates an empirical study of the concept of learner autonomy in the context of the gamified FLL classroom. How learner autonomy was operationalised in the design of the application (see also Chapter 5) was first assessed. The sociocultural concepts of *meaning potential* and *artefacts* were also used to discuss the design process. Then, the following research question was addressed:

- Did the gamified application support students' emergence of learner autonomy and if so, in what ways?

In order to investigate the emergence of learner autonomy, the data log from the application and interviews conducted with the students at the end of the school year were analysed. The analytical procedures are detailed in Chapter 6 (see also Appendices 3 and 5). Fieldnotes, video observations, students' productions on their blogs, and interviews with the teachers were used as contextualising data. After an initial overview of the groups' use of the application, three student cases from three different teams were examined.

In this study, it was found that the gamified application supported the students' emergence of learner autonomy. The students followed different learning paths, not only at the group level but also at an individual level. They used the application according to their own interests and learning styles.

The application's structure gave students the opportunity to make choices at different levels: which tasks to work on and with which working methods, and how to solve the tasks and with which resources. It was determined that the students used the choices offered by the application, yet they occasionally did so in ways that were unexpected and unintended in the design.

It was also revealed that the gamified application gave students the opportunity to create their own experience of the French class. The gamified structure, for example, motivated students who were previously uninterested in learning French. The openness of the tasks offered students the space to express their creativity; they could solve the tasks in many different ways with the media and resources they preferred. Finally, the application's design provided all students with an arena to communicate and use the foreign language. This was particularly important for more reserved students who seldom participated in classroom conversations.

This study yielded concrete examples of the use of gamification in an FLL context and demonstrated promising results regarding its role in supporting the emergence of learner autonomy. Such results are encouraging for the development of gamification research in relation to FLL practices.

7.4 Empirical contributions

The overarching aim of this thesis was to *investigate teachers' and students' experiences using a gamified application for FLL in a classroom context*. The following sections discuss the empirical contributions at a general level by addressing the two research questions presented in Chapter 1. Detailed findings can be found in the empirical studies. The first section focuses on the perception of playful learning situations in FLL contexts, while the second looks at students' interactions within a playful frame.

7.4.1 Setting up the playful frame

This section presents findings related to the process of creation of a playful frame in the classroom and engages with the following research question: *In what ways do teachers and learners perceive the presence of a playful frame in the classroom?*

In this thesis, teachers were shown to be changing roles. They described their role as that of a guide to help students in their learning. Lombardi (2015) presented similar findings. To explain this change of role, the concept of *setting up the playful frame*, first developed in Cruaud (2016), is helpful insofar as it represents the introduction of potentially playful elements into the learning situation by the teachers – the gamified application is one such element. Introducing gamification in the FLL class was understood as opening a playful frame in a classroom context. The playful frame can be considered a transformational frame, meaning that it conveys new meanings and interpretations of the interactions and artefacts within its borders (Goffman, 1974).

This type of frame changes the rules of interaction in the learning situation, and participants are given new roles.

However, some teachers perceived the presence of the playful frame and their change of roles negatively. They experienced a loss of control and of their sense of place in classroom interactions, leading to some extent to withdrawal from action. No similar findings have been reported in the field of gamification research.

In this thesis, it was found that when teachers have ownership over the gamified application, they are more likely to feel in control and to embrace the change in their status in the classroom. The perception of the teachers' role depends on their positioning and familiarity with the instructional design. Hanghøj and Brund (2010) concluded, similarly, that familiarity and ownership are essential to the success of the implementation of a new digital resource.

In the empirical studies, it was determined that most students entered the playful frame: everything they did was potentially playful. This playfulness represents an attitude that students alone can take towards a learning situation (Henriot, 1969). The teacher can set up a playful frame, but the initiative to act playfully belongs to the students. Similar findings were reported by Sanchez, Young, et al. (2016).

It was also found that students' perception of learning activities changed, and this can be explained with Goffman (1974) concept of the transformational frame. Within such a frame, the nature and meaning of students' interactions assume aspects from both playful and learning situations. In the empirical studies, it was discovered that students were both playful and at work on the learning tasks. Sanchez, Young, et al. (2016) arrived at similar conclusions. This change in the students' interpretation of the learning situation was also evident in their interactions within the playful frame, which is discussed below.

7.4.2 Inside the playful frame

This section addresses the second primary research question of this thesis: *How do students interact inside a playful frame?*

In the previous section, the students' interpretation of the playful frame was discussed. Findings were presented that demonstrated that students' attitudes were different when they framed an activity as playful. And indeed, in the empirical studies, it was found that students reported having fun and enjoying the gamified classes. Several studies on the gamification of education have yielded similar findings (Barata et al., 2013; Berns et al., 2016; De Freitas & De Freitas, 2013; Iosup & Epema, 2014; Lombardi, 2015; Perry, 2015a, 2015b). In addition, it was

shown that the students' playful attitude was expressed in friendly competition between them and their teams. Students used friendly competition as a way to make tasks more playful. The playful attitude was also visible in how some students decided to solve tasks: by being creative and using multiple types of media. This finding has not been previously reported in empirical research.

In this thesis, students were shown to use playful talk when working on the gamified tasks, expressed as either joking with other team members, playing with the foreign language, or being playful with the tasks. Wegerif (2007) described the importance of *playful talk* in learning dialogues within a dialogic space. Playful talk represents the students' use of playful language as a way to interact while collaborating on tasks and in order to spark creativity. No other gamification study has examined students' playful talk.

In the empirical studies, students experienced the gamified activities as different from their usual French lessons. In particular, they mentioned clearly in their interviews that the gamified activities had been fun, interesting and more engaging than typical French classes. They especially appreciated the variation in the tasks and the greater autonomy in the creation of their individual learning paths. Lombardi (2015) reported similar findings.

Students were also observed making autonomous choices about how to use the application and how to adapt the activities to their own learning paths. This is not just evident at the group level: different groups worked on different tasks and quests, some collaboratively while others individually, but also students from the same group often had different experiences of the application and different learning situations. In other words, students created their own learning paths inside the application, a finding supported by other gamification studies (Iosup & Epema, 2014; Lombardi, 2015; Perry, 2015b).

Regarding the students' choice of paths within the application, the gamified structure supported the emergence of learner autonomy. In the design of the application described in this thesis, different learning paths were made possible by the gamified structure. The levels, types of tasks (check-ins or quests) and openness of the tasks were some of the elements designed to offer more choice to the students (see Chapters 4 and 5). The gamified structure gave the students the opportunity to choose, and in that way, to develop their autonomy. This finding has not been reported previously in the field of research, as few studies have been conducted on learner autonomy within a gamified learning situation.

Continuing on the topic of the application's design, the empirical studies demonstrated that the students used the application in different ways. Students created a differentiated

experience of learning French inside the French class. Creative students focused more on creating multimodal answers to tasks, while more reserved students found an arena to communicate and participate in class conversations. Importantly, students took the initiative: they worked differently, at different times, with different resources, and on different tasks according to their own interests.

This description of the students' use of the application is related to another finding from this thesis: students were engaged in the gamified tasks. The structure of the application and the playful attitude it allows gave students the space to find their own way of becoming engaged in learning French. Similar findings were presented by several empirical studies (Iosup & Epema, 2014; Lombardi, 2015; Urias et al., 2016).

As they were becoming engaged in their learning, students not only solved the unlocked levels but created additional learning tasks, completed tasks outside of class, and in some cases, outside of school hours. Although the gamified activities were not part of their homework and were not rewarded with grades, some students started completing tasks in their free time. The application had been designed to be available at any time for individual students, but this was still an unexpected finding. It was never considered that the students would actually use the application without the teacher's supervision. This is an indication of the extent of the students' engagement with the activities.

Finally, in this thesis, it was found that the students used Norwegian in their interactions with peers while working on the tasks. They used it, for example, to organise their work or discuss ideas. French was only used orally to solve specific tasks or in some instances of playful talk. This finding conflicts with Perry (2015a, 2015b) results.

However, while using the gamified application, the students were in frequent contact with authentic documents in the foreign language and produced a great number of documents in the foreign language themselves. During the school year, they wrote articles, filmed videos and recorded podcasts. Being in contact with and producing content in a foreign language are two essential elements of developing one's foreign language competence and are also a sign of interest in the language and its culture.

Most of the findings presented above are in line with results from other empirical studies from the field of gamification of education. They contribute additional knowledge to a field still in development and indicate that even in different educational contexts, subjects or levels, gamification seems to bring about positive results. Students become more engaged in their learning, become more autonomous, and produce their own documents in the foreign language.

This thesis also contributes to the field of research by presenting new findings on the emergence of learner autonomy in relation to the use of a gamified application for FLL or on students' interactions within a playful frame. However, some findings nuance what has been found previously in other empirical studies, including the potential negative experiences of teachers with a playful frame and students' limited use of the foreign language in their interactions; bringing therefore, a more critical look at gamified activities.

7.5 Theoretical contributions

The main theoretical contribution of this thesis has been the development of a theoretical framework for studying playful situations in FLL contexts. This framework, first introduced in Article #2 and further developed in this thesis, constitutes a conceptual toolbox for researching playfulness in FLL. It gives researchers tools to better understand a playful situation in its entirety, from its artefacts and instructional design to the experiences of learners and teachers. This framework acts as a bridge between the field of FLL research and gamification research. It links theories on language learning and play to practice; and, more particularly, to the practice of FLL and teaching. The choice of a dialogic approach to language and a sociocultural perspective on artefact development created a coherent theoretical foundation on which FLL concepts could be combined with gamification principles. These two theoretical perspectives are in accordance with the AOA and offer a more holistic approach to gamification research that is focused on interactions, not solely on artefacts. Taking a dialogic approach to gamification research contributes to the development of a more conscientious theoretical understanding of the field.

This thesis contributes to the development of the theoretical field of research on play in FLL. As presented in Chapter 3, when play is mentioned in FLL literature, it is often from the point of view of lesson planning, such as suggesting concrete activities for teachers (Silva, 2008). It can, for example, comprise a list of small games to train different language competences. The literature on FLL often limits the understanding of play to filler activities for entertaining students in-between serious and valuable learning tasks. Play is rarely discussed theoretically, nor is it reflected upon as a different approach to learning (Silva, 2008). Although recent educational paradigms from FLL have presented play and games as an option for engaging students, few studies have looked at play as a theoretical matter, nor have they discussed the different aspects of its use in classroom activities (Silva, 2008; Sykes & Reinhardt, 2012). Very little is known about the use of play and games for teaching foreign languages in practice. The framework developed in this thesis conveys a new reflection on the use of games and playfulness

in the classroom, from being something that students *do* to being an attitude that students *take* towards their learning. This thesis not only presents an example of playful situations in practice, but also gives specific conceptual tools to analyse learners' experiences of playful learning. It adds a theoretical dimension to the as of yet limited discussion on the use of play and games in FLL education.

Lastly, this thesis contributes to research on play by making available to English speakers theories originally only published in French. The works of Henriot and his theory of play constitute a very interesting perspective on the essential question: *What is play?* (see Chapter 3). The theory gives researchers from the field of education the opportunity to think about play less in terms of objects and more in terms of the experiences of learners, as an attitude that one can take to a learning situation. In the same way, this thesis makes Silva (2008) understanding of play in FLL classes available to an English-speaking audience. Silva's four dimensions of play, presented in Article #2, also represent an interesting basis for thinking about the creation of playful situations in FLL contexts. Paired with Goffman (1974) concept of frame, Silva's dimensions of play yield an understanding of how teachers can create playful situations in practice, while hinting at the reaction of students to potentially playful learning situations.

7.6 Methodological contributions

This thesis provides an example of a DBR project, examining the implementation and use of a gamified application in an FLL class and researching the experience of playful learning for FLL. The description of the application creation process and its implementation at school, in particular its reflection on co-designing resources with teachers, is in itself a contribution to the field of DBR. In a field where each project contains its own unique characteristics, it is essential to continue presenting different examples of the use of this particular research method. This thesis contributes to the ongoing discussion on the different modalities of DBR projects. Via its analysis of teachers' experiences, the thesis sheds light on specific difficulties and advantages of co-design processes. Findings from the empirical studies add concrete examples to develop the methodologies of DBR, showing, for example, the importance of training sessions and teachers' familiarity with the application for successful implementation (see Article #1).

This thesis also presents a means to adapt DBR projects to the limited timeframe of a doctoral study. The choice to limit the number of iterations and test the first prototypes internally helped reduce the amount of time and number of persons involved, making the whole project

manageable by a single researcher. The choices made and described in Chapter 5 are also a contribution to the field of DBR research.

Finally, the artefact developed in this thesis, the gamified application, serves as a contribution to research and, potentially, to practice. The application is the embodiment of FLL theories and gamification principles. It represents an example of how gamification can be used in FLL classes for the creation of playful learning situations. The description of the choices made to operationalise the design principles of the application can help guide the design processes of other artefacts (see Chapter 5) or inspire new teaching practices. In addition, this artefact could be reused in future projects in order to study in more detail playful learning in educational settings. It can be easily adapted to different subjects or levels.

7.7 Concluding remarks

When I began this thesis in 2013, gamification research had just started developing and most actors in the field were still trying to define the concept and distinguish it from other, similar fields (e.g., serious games, game-based learning or playful design). At that time, and to the best of my knowledge, there were no published studies looking at the use of gamification for FLL in a classroom context. The field of gamification research has changed in the course of these four years, and a new wave of studies, within a play-based approach, has started to emerge. In the last year, while I was writing this extended abstract, several studies on the use of gamification in the FLL classroom have been published (see Chapter 2). The amount of research done in this particular field remains limited, but each new study brings fresh perspectives and areas of interest. In this way, this thesis contributes to the development of gamification research and, more generally, to research on playful learning. By taking a play-based approach to gamification design and research, this study assumed a unique angle to the study of how learners experience playful learning.

The findings from this thesis show promise for the use of gamification in FLL. From the perspective introduced in Chapter 1, which involves giving students the opportunity to practise the foreign language more often, be in contact with authentic documents, and develop their interests in the language and culture, the generated results have been very encouraging. The students' experience of learning with gamification has generally been very positive, and some students were especially engaged by the playful activities. However, this study also demonstrates that difficulties in the implementation of a digital resource can arise, especially in regard to teachers' perceptions of the playful frame and their new roles in the classroom.

As is often the case for a developing field of research and within a qualitative approach, this thesis generates more questions than answers. Many of the findings and observations discussed herein could be researched further in future research projects. The role of playfulness in giving shy students an arena for participation in classroom conversations, the engaging capacity of badges and competition, or the role of teachers within a playful learning situation are just some of these areas that could be developed. One thing is for certain, playful learning has great potential for FLL, and its use and characteristics need to be discussed and reflected upon. With this thesis, I hope to have contributed to the development of a theoretical discussion of play and playful learning that goes beyond lists of activities while remaining anchored in practice.

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Appendix 1: List of Empirical Studies

Reference	Setting	Subject	Method	Data	Length of use	N=
Barata 2013	High Ed	Information systems and computer engineering	Quan	Attendance at lectures, posts and downloads on Moodle, and grades.	Semester-long course Over 5 years (last 2 with gamification)	242
Cheong 2013	High Ed	IT	Quan	Questionnaire	4 week-period	76
De Freitas 2013	Army/High Ed	Computer science	Qual	Short survey Experience from implementation	5 months	15
Hakulinen 2013	High Ed	Computer science	Quan	Student activity log from online learning environment	8 weeks	281
Iosup 2014	High Ed	Computer science	Quan	Survey Experience from design	4 course sessions (over 3 years)	450
Huang 2015	High Ed	SPSS course	Quan	Pre-/post-test	2 weeks	40
Sanchez 2016	Upper secondary school	History / Geography Physics	Mixed Methods	Ethnographic data from 2 experiments Data log from the platform Online survey	1 school year	98
Urias 2016	High Ed	Architect / Engineering	Quan	Questionnaire Log from online forums	2 school years (one control year and one gamified)	116
Perry 2015	High Ed	FFL	Qual	Ethnographic data Survey Datalog	Three 50-minute sessions	11
Lombardi 2015	High Ed	EFL	Qual	Questionnaire Observation data	2 semesters	45
Berns 2016	High Ed	GFL	Mixed method	Technology Acceptance Model (TAM) survey Focus group interviews Pre-/post-test	4 weeks	91

Appendix 2: Description of Teacher Badges

Gamification: les badges professeurs

- 
Ecrivain: Tu as écrit des articles de qualité.
ECRIVAIN
- 
Commentateur: Tu as écrit des commentaires intéressants.
COMMENTATEUR
- 
Piplette: Tu as participé en classe de manière intéressante.
PIPETTE
- 
Dictionnaire: Tu as fait de bon progrès au niveau du vocabulaire.
DICTIONNAIRE
- 
Photo: Tu as partagé des photos intéressantes.
PHOTO
- 
Réalisateur: Tu as réalisé des vidéos de qualité.
RÉALISATEUR
- 
Compagnon: Tu as aidé activement les autres élèves.
COMPAGNON
- 
Quiz Master: Tu as créé des quiz de qualité.
QUIZ MASTER

Figure 1. Document handed out to the students.

Name	Description
Ecrivain	You wrote a quality article.
Commentateur	You wrote an interesting comment.
Piplette	You participated in the class conversation in an interesting way.
Dictionnaire	You made good progress in your vocabulary.
Photographie	You shared an interesting photo.
Réalisateur	You made a quality video.
Bon compagnon	You actively helped other students.
Quiz Master	You made a quality quiz.

Table 1. Translation of the document above.

Appendix 3: Data Collection Overview

Date	Group 1	Group 2
15/09/2014	13 minutes	13 minutes
19/09/2014	53	58
26/09/2014	34	-
10/10/2014	18	-
07/11/2014	37	36
14/11/2014	34	33
21/11/2015	48	44
06/03/2015	90	90
13/03/2015	57	57
20/03/2015	32	32
24/04/2015	50	-
08/05/2015	40	40
Total:	506 minutes (~8.5 hours)	403 minutes (~7 hours)

Table 1. Summary of the video data collection.

Date	Teacher 1: Mari (minutes)	Teacher 2: Emilie
19/09/2014	4:06	8:34
26/09/2014	8:23	5:25
10/10/2014	7:51	4:09
07/11/2014	8:04	5:37
14/11/2014	7:37	5:33
21/11/2014	4:15	-
06/03/2015	16:46	23:01
13/03/2015	7:24	-
20/03/2015	10:07	-
24/04/2015	10:08	-
08/05/2015	25:06	13:59
Total:	01:49:47	01:06:18

Table 2. Summary of the teacher interview data collection.

Date	Informants	Duration
15/06/2015	Group 1: Erik - Jonas	30 minutes
12/06/2015	Group 2: Marianne – Peter – Sindre	38 minutes
12/06/2015	Group 3: Ida - Jan	53 minutes
15/06/2015	Group 4: Ingrid - Nora	27 minutes

Table 3. Summary of the student interview data collection.

Name	Number of articles
Group 1	19
Group 2	20
Group 3	30
Group 4	20
Total	89

Table 4. Blog articles collected by group

Appendix 4: Examples from Video Data Coding



Figure 1. Example of the coding of one video sequence (G1D3).

Code name	Description	Example from data
Application	Students are discussing the application, the application's categories or navigating in the application.	Sara: In <i>Francophonie</i> ? Jonas: Yes. Erik: I think I am in... <i>Parlez Français</i> . (G1D8)
Competition and game	Students are talking about competition or referring to games.	Sindre: 4-1-4 We have to complete it in order to get a badge! I think we can get that one ((points at the screen)) (G2D12)
Difficulties	Students are either talking or acting like they are having difficulties with the tasks. They are, for example, lost; they misunderstand something or are annoyed about something.	Sara: Lovely. But in Blog in the uh the list, kind of on page 3, there is <i>compléter la liste</i> . Jonas: I don't understand what type of list this is. Sara: We didn't write any list. Jonas: Is it in <i>Parlons Français</i> this list? (G1D12)
Group interaction	They are interacting inside the team. They are discussing ideas, organizing their work or asking questions to another member of the same team.	Sindre: We're up in level 2 on the one down there <i>Francophone</i> . Magnus: Ok. Sindre: But are you going to do the last one, the article thing? Magnus: Yes yes, I took the responsibility for it in fact. (G2D7)
Peer interaction	Students are interacting with students from a different team or with productions from another team (for example, to get inspiration for their own productions).	Marianne: What is <i>vâr</i> ? Jan what is <i>vâr</i> ? ((turning around and asking a student from another group)) Jan: <i>Vâr</i> ? Emilie: Like in <i>ours</i> . (G2D2)

Teacher interaction	Students are interacting with the teacher: asking a question or being asked a question by the teacher.	Mari (teacher): How is it going? Erik: uhm it's going fine. Mari: What are you doing? Erik: We're trying to Jonas: find a way to use the expressions we have. (G1D7)
Language	Students are reading, translating or speaking the foreign language. The category also refers to when students are using a language other than Norwegian or French.	Marianne: What is <i>innlevering</i> in English? (...) <i>Assignment?</i> Sindre: Take it from Norwegian and then check the meaning in English. Marianne: <i>Submission</i> . Sindre: Yes that's correct. Marianne: <i>Submission</i> . Sindre: Now you can (...) find it in French. Marianne: <i>Soumission</i> . (G2D5)
Playful talk	Students are joking, using banter or silly talk.	((Selecting a category for their blog)) Sindre: But this is fishing. Isn't it a fishing blog? ((laughs)) Marianne: Uhm no <i>this is no fish blog</i> Peter: <i>Well we're fishing for likes so</i> ((laughs)) (G2D2)
Technology and tools	Students are discussing something related to the technology: asking for help to do something on the computer, explaining a technology-related issue to a peer.	Jonas: Should I log out or? Erik: Well that's not really. It doesn't really matter. I think. Jonas: Just <i>refresh</i> it and then log in. (G1D2)

Table 1. Examples from the coding categories of the video data

Text in italics in the quotes is kept in the language that was spoken in the interaction; for example, Norwegian, French or English.

Appendix 5: Examples from Interview Data Coding

Code name	Description	Example from data
Teachers' role in the classroom	Teachers are discussing what they are doing in the classroom when the students are using the application and how they feel about it.	'I am walking from group to group to see what they are doing'. (T2.6 – 06/03/2015)
Students' familiarity with IT and the application	Teachers are discussing if the students are struggling or not with the application and other IT resources.	'They are not completely used to the software yet. But I think it will go fine as soon as they're used to it, as they learn how to use it, it will be easy'. (T1.1 – 19/09/2014)
Students' use of the application	Teachers are discussing the students' use of and reaction to the application.	'I noticed that the groups are working very differently. In one group they were discussing a lot. Not always about serious things but it was going well. They were going forward in the tasks'. (T1.4 – 07/11/2014)
Teachers' use of the application and IT resources.	Teachers are discussing the application and other IT resources and their use in their teaching.	'I used to give them online exercises [from the textbook] but the results were in fact not very good. It's more for having fun I think'. (T2.6 – 06/03/2015)

Table 1. Examples from the coding categories of the teachers' interviews.

Code name	Description	Example from data
Agency	Talking about taking initiative, making choices on their own.	'I really liked that it was very interactive and that we could decide on our own what we wanted to do'. (Peter, I.G2).
Compare to normal class	Discussing how it was to work with the application in comparison to a normal French period	'In a usual French period it's not that it is like boring, but it is a bit normal. It has been quite exciting to get something new to do in each lesson, like now, we're going to work on something different'. (Nora, I.G4)
Competition	Discussing competition, earning badges, feeling rewarded or competitive	'I think it's fun to have something to push you a bit to do it or to do more. And it's always nice to feel that you've achieved something and got a little badge'. (Marianne, I.G2)
Differentiated learning	Talking about the variations among groups, students, tasks or working methods	'It was quite free to do the tasks, so one group had done it in this way, and another group had done it in another way'. (Erik, I.G1).
Difficulties	Discussing when things are getting difficult: either boring, too long, technical issues, feeling lost and so on; and talking negatively about the experience	'It's really open and it can be a bit difficult to choose what we will work on and how we will do it'. (Erik, I.G1)
Learning	Talking about learning the foreign language and learning the different language competences	'It is more learning for learning's sake. You're not doing it to get a better grade in French but to learn French'. (Peter, I.G2)
Motivation	Discussing what motivated them when	'It may be a bit silly but I think the blog was a

	working with the application	good way to show what we had done and not just do it and delete it. You post it and it feels like, it feels better in a way, like you've accomplished something'. (Marianne, I.G.2)
Multimodal	Discussing the use of different media when working with the application	'We posted photos and things like that. I think it was fun. We posted a song a couple of... no, once'. (Nora, I.G.4)
Peer interaction	Discussing different types of interactions with other students: either inside the same group, in the classroom or on the application and blogs	'It was fun to visit other teams' blogs and see what they had done and comment on it'. (Erik, I.G1)
Positive things	Talking good about their experience, the application, and about having fun and being playful	'Working in these gamification groups has been really fun!' (Peter, I.G2)
Strategies: <i>selecting</i>	Discussing how they selected the tasks	'We chose [a task] from the categories that were there and from how far we had come'. (Jan, I.G3).
Strategies: <i>organising</i>	Discussing how they organised their work on the tasks (e.g., collaborative or individual work)	'We shared the tasks like you take a part of the task, you take the other and then afterwards, we put it together'. (Ida, I.G3).
Strategies: <i>completing</i>	Talking about completing a task, finishing something.	'That's what we were doing in the group, and we wanted to finish it'. (Marianne, I.G2).
Teacher	Discussing the role of the teacher and their interactions with the teacher during the work with the application.	'We always got help to understand [the directions] and get through the tasks'. (Marianne, I.G2)
Using the application	Discussing things related specifically to the use of the application and its functions: the content, the unlocking system, navigating in the interface, and so on.	'The pages were easy to understand and it wasn't difficult at all to find out what we should be doing during the period. It was easy to find our way'. (Ingrid, I.G4)

Table 2. Examples from the coding categories of the students' interviews

Part 2: The studies

Appendix 1

Code name	Description	Example from data
Agency	Talking about taking initiative, making choices on their own.	'I really liked that it was very interactive and that we could decide on our own what we wanted to do'. (Peter, I.G2).
Compare to normal class	Discussing how it was to work with the application in comparison to a normal French period	'In a usual French period it's not that it is like boring, but it is a bit normal. It has been quite exciting to get something new to do in each lesson, like now, we're going to work on something different'. (Nora, I.G4)
Competition	Discussing competition, earning badges, feeling rewarded or competitive	'I think it's fun to have something to push you a bit to do it or to do more. And it's always nice to feel that you've achieved something and got a little badge'. (Marianne, I.G2)
Differentiated learning	Talking about the variations among groups, students, tasks or working methods	'It was quite free to do the tasks, so one group had done it in this way, and another group had done it in another way'. (Erik, I.G1).
Difficulties	Discussing when things are getting difficult: either boring, too long, technical issues, feeling lost and so on; and talking negatively about the experience	'It's really open and it can be a bit difficult to choose what we will work on and how we will do it'. (Erik, I.G1)
Learning	Talking about learning the foreign language and learning the different language competences	'It is more learning for learning's sake. You're not doing it to get a better grade in French but to learn French'. (Peter, I.G2)
Motivation	Discussing what motivated them when working with the application	'It may be a bit silly but I think the blog was a good way to show what we had done and not just do it and delete it. You post it and it feels like, it feels better in a way, like you've accomplished something'. (Marianne, I.G.2)
Multimodal	Discussing the use of different media when working with the application	'We posted photos and things like that. I think it was fun. We posted a song a couple of... no, once'. (Nora, I.G.4)
Peer interaction	Discussing different types of interactions with other students: either inside the same group, in the classroom or on the application and blogs	'It was fun to visit other teams' blogs and see what they had done and comment on it'. (Erik, I.G1)
Positive things	Talking good about their experience, the application, and about having fun and being playful	'Working in these gamification groups has been really fun!' (Peter, I.G2)
Strategies: <i>selecting</i>	Discussing how they selected the tasks	'We chose [a task] from the categories that were there and from how far we had come'. (Jan, I.G3).
Strategies: <i>organising</i>	Discussing how they organised their work on the tasks (e.g., collaborative or individual work)	'We shared the tasks like you take a part of the task, you take the other and then afterwards, we put it together'. (Ida, I.G3).
Strategies: <i>completing</i>	Talking about completing a task, finishing something.	'That's what we were doing in the group, and we wanted to finish it'. (Marianne, I.G2).
Teacher	Discussing the role of the teacher and their interactions with the teacher during the work with the application.	'We always got help to understand [the directions] and get through the tasks'. (Marianne, I.G2)
Using the application	Discussing things related specifically to the use of the application and its functions: the content, the unlocking system, navigating in the interface, and so on.	'The pages were easy to understand and it wasn't difficult at all to find out what we should be doing during the period. It was easy to find our way'. (Ingrid, I.G4)

Overview of the coding scheme: examples from the coding categories of the students' interviews

Errata list

- Page vii:

Article #1 has been accepted for publication in a revised version:

Cruaud, C. (accepted for publication). Designing with Teachers: Contrasting Teachers' Experiences of the Implementation of a Gamified Application for Foreign Language Learners. In Hans Christian Arnseth, Thorkild Hanghøj, Thomas Duus Henriksen, Morten Misfeldt, Robert Ramberg, & Staffan Selander (Eds.), *Game-oriented learning designs. Scandinavian Perspectives*. Sense Publishers.

- Page 8:

The following sentence should read as:

“The extended abstract contains [seven] chapters”