

PRACTICING ENGLISH AND SWEDISH AS FOREIGN LANGUAGES  
COOPERATIVELY THROUGH A MOBILE GAME:  
A Case Study of 8<sup>th</sup> Grade Students' Perceptions in Finland

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Pro Gradu Thesis  
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## JYVÄSKYLÄN YLIOPISTO

Tiedekunta – Faculty Humanistis-yhteiskuntatieteellinen tiedekunta	Laitos – Department Kieli- ja viestintätieteiden laitos
Tekijä – Author Neea-Stiina Urpilainen	
Työn nimi – Title PRACTICING ENGLISH AND SWEDISH AS FOREIGN LANGUAGES COOPERATIVELY THROUGH A MOBILE GAME: A Case Study of 8 <sup>th</sup> Grade Students' Perceptions in Finland	
Oppiaine – Subject Englanti (pääaine) ja ruotsi (sivuaine)	Työn laji – Level Pro gradu -tutkielma
Aika – Month and year Toukokuu 2019	Sivumäärä – Number of pages 125 + 6 liitettä
<p>Tiivistelmä – Abstract</p> <p>Mobiilipelit ovat kasvava osa ihmisten päivittäistä elämää sekä nykyään myös vieraiden kielten oppimista kouluissa. Lisääntyvä kiinnostus on heijastunut tutkimukseen mobiiliteknologian hyödyntämisestä vieraiden kielten opiskelussa mobiilivasteisen kielen oppimisen (esim. Gafni, Achituv ja Rachmani 2017) ja pelipohjaisen kielen oppimisen (esim. Reinhardt ja Sykes 2012) myötä, sekä enenevässä määrin myös yhteistoiminnallisessa kielen oppimisessa (esim. Fu ja Hwang 2018, Kukulka-Hulme ja Viberg 2018, Holden ja Sykes 2011).</p> <p>Aiemmat tutkimukset eivät kuitenkaan ole selvittäneet oppilaiden näkemyksiä pelipohjaisen ja yhteistoiminnallisen oppimisen yhdistämisestä mobiilipelin avulla tilanteessa, jossa oppilaat harjoittelevat kahta vierasta kieltä samaan aikaan. Edeltävät tutkimukset ovat hyödyntäneet valmiita yhteistoiminnallisia työtapoja sen viiden perusperiaatteen (Johnson, Johnson ja Holubec 1994) suoran soveltamisen sijaan. Tämän tutkimuksen tarkoituksena on vastata näihin puutteisiin tarkastelemalla oppilaiden näkemyksiä englannin ja ruotsin samanaikaisesta harjoittelusta kolmen hengen ryhmissä yhteistoiminnallisen <i>School Detectives</i>-mobiilipelin pelaamisen perusteella.</p> <p>Tutkimukseen osallistui yhteensä yhdeksän 8.-luokkalaista oppilasta itäsuomalaisesta koulusta. Aineisto koostui pelin pelaamistilanteiden videoinneista ja observoinneista, yksilöllisesti täytetyistä kyselyistä sekä ryhmähaastatteluista. Materiaali analysoitiin laadullisen sisällönanalyysin avulla. Tulokset osoittavat, että vaikka oppilaiden näkemykset olivatkin monisyisiä, he suhtautuivat mobiilipeliin ja sen tarjoamiin kielten opiskelumahdollisuuksiin varsin myönteisesti. Yhteistoiminnalliset ryhmät koettiin hyödyllisiksi sosiaalisten taitojen ja kielten oppimisen sekä pelissä etenemisen kannalta. Suurin osa oppilaista piti enemmän englannista kuin ruotsista osana peliä, mutta kahden kielen rinnakkainen käyttö pelissä nähtiin hyvänä asiana siitä näkökulmasta, että samalla oppii useampaa kuin yhtä kieltä. Lähes kaikki halusivat pelata vastaavaa peliä jatkossa, ja osa oppilaista suhtautui myönteisesti ajatukseen useamman kielen yhtäaikaisesta opiskelusta yleisesti kielten tunneilla.</p> <p>Tutkimuksen tarkoituksena on innostaa kielten opettajia luomaan ja kokeilemaan mobiilipelejä rohkeasti osana opetusta. Tulosten perusteella yhteistoiminnallinen mobiilipeli voisi olla oppilaille mieluinen toteutustapa monialaisille oppimiskokonaisuuksille, jolloin peliin voisi yhdistää eri kielten lisäksi muitakin oppiaineita. Jatkotutkimuksen tehtäväksi jää selvittää, kuinka paljon oppilaat todellisuudessa oppivat peliä pelaamalla.</p>	
Asiasanat – Keywords cooperative learning, language learning, mobile learning, mobile games, content analysis, qualitative research	
Säilytyspaikka – Depository JYX	
Muita tietoja – Additional information	

## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION</b> .....	4
<b>2</b>	<b>MOBILE GAME-BASED LANGUAGE LEARNING</b> .....	7
2.1	Different frameworks for language learning through games .....	7
2.2	Mobile-assisted language learning (MALL) .....	11
2.2.1	Description of MALL.....	11
2.2.2	Previous MALL studies .....	14
2.3	Location-based AR mobile games for language learning .....	16
2.4	ARIS.....	18
<b>3</b>	<b>COOPERATIVE LEARNING</b> .....	22
3.1	Terms and definitions .....	22
3.2	The five key elements .....	26
3.2.1	Positive interdependence.....	26
3.2.2	Individual accountability.....	27
3.2.3	Promotive interaction .....	28
3.2.4	Interpersonal and small group skills.....	29
3.2.5	Group processing.....	30
3.3	Advantages of cooperative learning based on the social interdependence theory ...	31
<b>4</b>	<b>COOPERATIVE LANGUAGE LEARNING (CLL) IN THE MOBILE GAME CONTEXT</b> .....	36
4.1	Mobile game-based CLL.....	36
4.2	Students' perceptions of mobile game-based CLL .....	40
4.3	Mobile game-based CLL in the National Core Curriculum for Basic Education (NCC 2016).....	44
<b>5</b>	<b>THE PRESENT STUDY</b> .....	48
5.1	Research aim and questions .....	48
5.2	Data collection.....	50
5.2.1	Participants .....	51
5.2.2	ARIS game <i>School Detectives</i> .....	51
5.2.3	The game-play.....	58
5.2.4	Questionnaire .....	61
5.2.5	Interview.....	63
5.3	Qualitative content analysis .....	65
<b>6</b>	<b>STUDENTS' PERCEPTIONS OF THE MOBILE GAME-BASED CLL SETTING COMBINING TWO TARGET LANGUAGES</b> .....	68
6.1	Previous gaming and language learning experience .....	68
6.2	Perceptions of the game-play in general .....	69

6.3	Perceptions of the cooperative group work.....	74
6.3.1	Cooperative group work in general and with respect to the roles.....	74
6.3.2	The impact of the cooperative exercise on the cooperative group work.....	79
6.3.3	Satisfaction with the cooperative group work and own effort .....	80
6.4	Perceptions of English and Swedish .....	83
6.4.1	Versatile opportunities for practicing English and Swedish .....	83
6.4.2	Learning new words .....	86
6.4.3	Language preference .....	92
6.5	Perceptions of using two target languages in parallel.....	95
6.6	Perceptions of mobile game-based CLL as part of foreign language lessons.....	98
6.6.1	Willingness to play a similar game in the future.....	98
6.6.2	Willingness to study English and Swedish on a joint lesson .....	100
<b>7</b>	<b>DISCUSSION AND CONCLUSION.....</b>	<b>103</b>
7.1	Findings in relation to the research questions .....	104
7.2	Implications of the findings.....	109
7.3	Strengths and limitations of the present study .....	111
7.4	Suggestions for future research .....	115
	<b>BIBLIOGRAPHY .....</b>	<b>118</b>
	<b>APPENDICES .....</b>	<b>126</b>
	Appendix I: Cooperative Exercise (English translation).....	126
	Appendix II: Observation grid (English translation).....	128
	Appendix III: Questionnaire (original in Finnish, translation in English) .....	129
	Appendix IV: Interview script (original in Finnish, translation in English) .....	134
	Appendix V: Coding frame .....	139
	Appendix VI: Quotes .....	155

## 1 INTRODUCTION

The role of mobile technology has become increasingly important not only in our everyday life but also in the educational context over the past years. As access to mobile devices and Wi-Fi connection has become more of a norm than luxury in the Finnish school system, and as the use of Information and Communications Technology (ICT) in teaching and learning is more pivotal than ever, mobile devices will likely continue to increase in popularity in the context of language learning and teaching in Finland. The educational advantages of mobile technologies have been reported extensively: some examples include the ubiquitous nature of learning (Liu and Chu 2010), increased engagement (Hirsh-Pasek, Zosh, Michnick Golinkoff, Gray, Robb and Kaufman 2015), as well as authentic learning contexts (Fu and Hwang 2018).

Simultaneously, cooperative learning has established a more and more prominent position as a pedagogical approach, and over the past decade an increasing amount of research has focused on the rather novel learning approach: mobile cooperative learning (Fu and Hwang 2018). The volume of research on mobile cooperative language learning expanded by 600% in 2012–2016 in comparison to 2007–2011, which makes languages the second most popular learning domain in this research context, and posits language learning as a subject that will potentially attract enormous research interest in the future (Fu and Hwang 2018: 135). The field of mobile learning within language education is known as mobile-assisted language learning (MALL), and it has been reported to have beneficial educational effects on cooperative learning (Kukulaska-Hulme and Viberg 2018).

MALL can be conducted through mobile games, and different apps for doing this can be used in either game-enhanced or game-based ways, i.e. by using vernacular games in language learning and teaching, or by designing games deliberately for language learning purposes, respectively (Reinhardt and Sykes 2012: 33). Game-enhanced learning has already been studied in Finland in terms of upper-secondary school students' perceptions of learning English from video games in an informal and voluntary context, and the findings showed that digital games significantly contributed to the students' English skills (Erkkilä 2017). In the present study, I will investigate students' perceptions from a different perspective by focusing on game-based language learning in a cooperative mobile game context, i.e. on mobile game-based cooperative language learning.

Plenty of previous studies have investigated mobile game-based cooperative learning in different subjects. Berns, Isla-Montes, Palomo-Duarte and Doderio (2016) created a hybrid mobile game and researched university students' learning of German in Spain through an app called *VocabTrainerAI*. The mobile game was hybrid in the sense of combining individual learning tasks with a cooperative murder mystery game. Game-based cooperative learning studies not focusing on language learning are also worth attention, for instance from the perspective of how cooperative learning has been arranged in the mobile setting: Bressler's (2015) study elaborated on how a cooperative augmented reality (AR) game can be used for middle school science inquiry. Several place-based AR mobile games for language learning have been created on ARIS, for example *ChronoOps* (Thorne, Hellermann, Jones and Lester 2015), *Mentira* (Holden and Sykes 2011), and *Explorez* (Perry 2015). ARIS (Augmented Reality Interactive Storytelling) is a free open-source platform for creating AR games and interactive stories, as well as an app that can be downloaded on iOS devices, and it was used also in this study.

To my knowledge, no previous studies have explored mobile game-based cooperative language learning (CLL) in the context of practicing two foreign languages in parallel. Moreover, prior studies on CLL in a mobile game context seem to have utilized a particular cooperative structure (see e.g. Holden and Sykes 2011) instead of applying the five main principles of cooperative learning (Johnson, Johnson and Holubec 1994) more freely in the game-play setting. Furthermore, the current trend has been to conduct mobile cooperative learning research at the university or college setting at the expense of focusing on younger students (Fu and Wang 2018: 129).

The present study aims to fill these gaps by investigating students' perceptions of practicing two target languages, English and Swedish, cooperatively at the same time in a mobile game-based learning setting in an upper comprehensive school in Finland. In order to do so, the *School Detectives* mobile game was designed on ARIS, and altogether nine 8<sup>th</sup> grade students played the game in cooperative groups of three. The data was gathered through questionnaires, group interviews and video recordings as well as observations of the game-play, and qualitative content analysis was used to analyze it. The present study has been awarded a research grant by the Society of Swedish Literature in Finland (SLS), and the data is stored in their archive. This study continues to build on the increasing amount of research focusing on individuals' learning experiences (Fu and Wang 2018: 138). Furthermore, the

present study will contribute to the volume of research on mobile cooperative language learning and game-based foreign language learning in a location-based AR mobile game setting. In short, this study aims to shed light on upper comprehensive school students' perceptions of learning two target languages in parallel in a mobile game-based CLL setting by answering the following research question: "How do the students perceive this mobile game-based cooperative language learning setting that combines two target languages?"

It should be clear at this point that I have chosen the phenomenon of mobile game-based cooperative language learning (CLL) because of its novelty and increasing popularity as well as relevance. Another reason is that I wanted to set a low-threshold example and encourage foreign language teachers and researchers to experiment with game-based learning by creating their own mobile games, as ARIS does not require any programming skills. As Reinhardt (2013: 11) has put it, "FL professionals need to familiarize themselves with the phenomenon of digital gaming and its potential to inform and even transform FL teaching and learning" (FL refers to foreign language). Throughout this thesis, I will be referring to English and Swedish as foreign languages. I am aware of the distinction between foreign and second languages, but this difference is not important in this thesis. Thus, Swedish will not be referred to by using its official term second national language.

The present study is structured into sections as follows. After this introductory section, the underlying theoretical framework is established in the following main sections: section 2 discusses mobile game-based language learning, section 3 introduces cooperative learning, and section 4 elaborates on cooperative language learning in the mobile game context. This will be followed by introducing the outline of the present study in section 5, including elaboration on the research aim and questions, data collection, and method of analysis. The results of this study will be presented in section 6 by discussing the students' perceptions of the mobile game-based CLL setting combining two target languages. In section 7, the research questions will be answered by concluding the findings and discussing their implications. Furthermore, the strengths and weaknesses of the current study will be evaluated, and suggestions for future research will be provided. Finally, the sources are listed in the bibliography, and supplementary material is given as appendices.

## **2 MOBILE GAME-BASED LANGUAGE LEARNING**

Game-based learning through mobile games within the context of language learning combines different salient theoretical frameworks: on the one hand, it deals with several frameworks concerned with language learning through games, and on the other hand, it is situated within mobile-assisted language learning (MALL). These concepts are somewhat, but not entirely, overlapping and intertwined in the sense that the games involved in language learning may be (but do not have to be) played by using mobile devices, whereas using games in language learning is only one of the multiple ways of conducting MALL. To put it another way, games and mobile devices in language learning and teaching have an enormous potential to be applied in different ways, and sometimes the chosen approach combines the two. The current research project is situated in a crossing point where these two approaches intersect, which I shall call mobile game-based language learning. In the following, I will elaborate on the two approaches and discuss location-based augmented reality (AR) games as well as a specific platform and app suited for creating and playing such games (ARIS). I will start by presenting different frameworks for language learning through games.

### **2.1 Different frameworks for language learning through games**

As an attempt to keep up with technological developments in the past decades, several different frameworks dedicated to utilizing games in learning have been created, and some of these have further been developed to specifically address the context of language learning. In the following, I will introduce what seem to be the most widely used frameworks concerning games and language learning and compare them with each other. Some of these approaches are easily distinguishable, whereas others are more overlapping. However, a shared feature in all of them is the crucial involvement of games. Salen and Zimmerman (2004: 80) define a game as “a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome”.

Before narrowing the focus down to language learning, it is feasible to start with game-based learning (GBL), which is a broader field encompassing games in education. According to Liu and Chu (2010: 632), GBL “is designed to combine learning and game playing, so it will improve the ability of the player to retain education subjects and apply them to the real world”. Furthermore, GBL can be used to implement a learner-centered pedagogy while balancing the subject content with game-play in an engaging and motivating way (Ghazal and

Singh 2016: 2). Games are beneficial for learning also in the sense that they lower the affective filter of the students, and thus make them less worried about making mistakes (Richardson 2016: 35). It is worth pointing out that GBL includes also non-digital games. Ghazal and Singh (2016) discuss the benefits of GBL with regards to three non-digital games in the English classroom with limited or insufficient access to technical resources, such as computers. However, it is important to point out that Ghazal and Singh (2016: 2) use GBL as an umbrella term for game-based learning and gamification, the latter of which deserves to be dealt with separately.

Gamification can be defined as the use of game elements in non-game contexts (Gafni, Achituv and Rachmani 2017: 304) in order to “engage people, motivate action and promote learning” (Perry 2015: 2308). Furthermore, gamification can be seen as a didactic method (Perry 2015: 2309), and it can be used in practice for instance by integrating game elements such as point systems or badges into traditional, non-game activities, which enhances student motivation and engagement (Centre for teaching excellence n.d). While both approaches promote engagement, the main difference between gamification and GBL is that game elements are applied to “conventional” activities in the former, whereas the activities are “intrinsically game-like” in the latter (ibid.). In the language classroom, gamification could be used for example by rewarding students with different points or badges in accordance with how many foreign language words in a specific theme they have come up with. On the contrary, playing a memory game (either traditionally or digitally) in pairs or groups to practice new vocabulary in the target language would be considered game-based learning.

Cornillie, Thorne and Desmet (2012: 249) have composed a list of seven central game elements and their presupposed benefits based on Vandercruysse, Vandewaetere and Clarebout 2012, as illustrated in Table 1 below.

Table 1. Game elements and their benefits (compiled based on Cornillie et al. 2012: 249)

<b>Game elements</b>	<b>Benefits</b>
fun and enjoyability	enjoyment, pleasure, motivation
rules	structure
goals and objectives	motivation, stimulation
interaction	being active, interacting with others

outcomes and feedback	learning, informing about progress
problem solving, competition or challenge	adrenaline, excitement, creativity
representation, story, fantasy or context	emotion, enthusiasm, stimulation

The major game elements and their corresponding benefits, as listed in Table 2, can be used in gamified and game-based learning. However, they are not compulsory components, as it is important to select the game elements so that they facilitate meeting the specific learning objectives of the activity or task in question (Centre for teaching excellence n.d.).

Perry (2015) studied gamification via a French language-learning tool *Explorez*. Altogether 11 university students participated in the case study in Canada, and they played the game in four groups for three sessions, 50 minutes each (Perry 2015: 2311-2312). The data was both qualitative and quantitative in its nature and it consisted of questionnaires, focus groups, audio recordings of the game-play, and player-created content in the learning tool (Perry 2015: 2312). The results showed that the participants highly valued the game elements of quests and cooperation followed by badges and avatars (Perry 2015: 2314). It is important to point out that Perry (2015) herself uses *gamification* as the main theoretical framework, which is rather contradictory in the light of the definition of game-based learning used in this study: *Explorez* is an intrinsically game-like activity in itself, applying game-elements in a game setting in contrast to non-game like activities (Centre for teaching excellence n.d), and thus it should be regarded as game-based learning. In this study, gamification is not an appropriate term to use because game elements have been applied in a mobile game context as opposed to using them to enrich a non-game classroom activity. However, the game elements described above are applicable also when learning occurs in real game contexts, i.e. in game-based learning.

In order to narrow the focus of GBL to digital games within the context of language learning, a new framework called digital game-based language learning has been developed. According to Cornillie et al. (2012: 243), digital game-based language learning has expanded significantly over the past decade. The authors define it as “the design and use of a diverse array of digital games for the purpose of learning or teaching a second or foreign language (L2)” (ibid.). Its roots are not only in GBL, but also in CALL, which is short for computer-assisted language learning (Cornillie et al. 2012: 244). CALL was established within the domain of language education in the 1980’s, and the many definitions of CALL to date have

in common the involvement of computers in the process of language learning (Jarvis and Archileos 2013: 1-2). Cornillie et al. (2012: 246) posit that the main division within digital game-based language learning is twofold: on the one hand, there are games designed specifically for the purposes of learning and teaching L2, i.e. synthetic immersive environments, and on the other hand, there are games not specifically developed to be used in L2 teaching and learning, i.e. commercial off-the-shelf (COTS) games.

This resembles Reinhardt and Sykes's (2012: 33) taxonomy which emphasizes the difference between game-based and game-enhanced second and foreign language (L2) learning and teaching. Game-based L2 learning and teaching make use of games that have been developed for the purpose of L2 education, which is identical with synthetic immersive environments described above. Similarly, game-enhanced L2 learning and teaching correspond to COTS in the sense that the focus is on vernacular games that have not been developed for L2 educational purposes. Reinhardt and Sykes (2012: 33-34) highlight that research is needed and valuable in both perspectives, while also acknowledging that other taxonomies have proposed a different distinction between *enhanced* and *based*. The authors resist the proposal of defining *game-enhanced* as less comprehensively integrated and *game-based* as more comprehensively integrated into a curriculum for the following reasons (Reinhardt and Sykes 2012: 34). Firstly, if game-enhanced is understood as less integrated into the curriculum, this runs the risk of presenting vernacular games as less important research domains than games developed for the purposes of L2 learning and teaching. Secondly, not all games specifically designed for L2 learning and teaching purposes are, nor should they be, integrated into the curriculum "as comprehensive L2 learning environments", but rather as supplements dedicated to particular narrow areas of language learning. Due to these convincing arguments, Reinhardt and Sykes's (2012) definitions of game-enhanced and game-based learning and teaching will be adopted in this study.

In addition to differentiating between the terms *game-based* and *game-enhanced*, Reinhardt and Sykes (2012: 43) make a distinction between learning and pedagogy in this matter: "When research focuses on how a game 'teaches' an L2 or how it is taught with, we would consider it pedagogy research, while if it focuses on how learners learn with a particular game, we would consider it learning research". Furthermore, game-based L2 pedagogy research analyzes how a specific game developed for the purposes of L2 teaching and learning is pedagogically implemented (ibid.). Moreover, L2 learning research investigates "a

learner's game-play experience" (Reinhardt and Sykes 2012: 44-45). Furthermore, the authors acknowledge that many studies combine both perspectives due to the intertwined nature of L2 pedagogy and learning (Reinhardt and Sykes 2012: 33).

In the present study, I will adopt the perspective of game-based learning. Firstly, I have developed a game specifically for the purposes of L2 learning, which makes it clear that my perspective is not *game-enhanced*. Secondly, in this study, the students' experiences in terms of their perceptions of the developed game and the game-play situation are emphasized. It should be noted, however, that the game is pedagogically implemented by using cooperative learning, and thus there is also some focus on the pedagogy aspect. Moreover, research on game-based language learning is needed, as students' perceptions of game-enhanced learning have already been studied in Finland, as Erkkilä (2017) found out that digital games were seen to contribute significantly to upper-secondary school students' (N=779) English skills.

To conclude, game-based language learning was deemed applicable in the present study in contrast to the numerous other terms in the rather fuzzy and complicated field of research regarding language learning through games. However, it will be broadened into *mobile game-based language learning* in order to better account for the aspect of mobile learning in this study. The term mobile game-based learning has been employed in previous studies to some extent (see e.g. Huang, Chang and Wu 2017), and it can be regarded as a fusion of game-based learning and mobile learning, the latter of which I will discuss in more detail below in the context of language education, i.e. in terms of mobile-assisted language learning (MALL).

## **2.2 Mobile-assisted language learning (MALL)**

Mobile-assisted language learning (MALL) is devoted to the use of technology in language learning, and it is also known as mobile language learning (Kukulska-Hulme, Norris and Donohue 2015: 2). In the following, I will first describe the essence of MALL and then move on to discussing some prominent MALL studies.

### **2.2.1 Description of MALL**

To begin with, MALL is conceptualized to be a part of the broader field of mobile learning (m-learning), which can be defined as "learning mediated via handheld devices and potentially available anytime, anywhere", in the context of either formal or informal learning,

typically using the most recent technologies (Kukulska-Hulme and Shield 2008: 273). Winters (2006: 5-6) points out that mobile learning has various definitions depending on the perspective that is emphasized. The technocentric perspective dominates the literature by emphasizing portability and learning through the use of mobile devices; the e-learning perspective is rather vague as it classifies m-learning as its extension; the augmented formal education perspective tends to lead to a comparison between traditional face-to-face teaching and mobile learning; and, finally, the learner-centered perspective emphasizes the mobility of the learner rather than that of the device (ibid.). The key term used in this study, *mobile game-based cooperative language learning*, is a blend of several terms, and the aspect of MALL that is emphasized in it will be available in the definition presented later on (see section 4.1).

As a result of the development and widespread availability of mobile devices, MALL has been created on the basis of the older field of CALL (see discussion of CALL above in 2.1), the main difference being that MALL makes use of “personal, portable devices that enable new ways of learning, emphasizing continuity or spontaneity of access and interaction across different contexts of use” instead of making use of computers (Kukulska-Hulme and Shield 2008: 273). The review by Lemke, Coughlin and Reifsneider (2009: 27) illustrates that learning through mobile devices can have promising effects on basic skills, higher level of thinking, ICT, collaboration, and engagement on learning. MALL is a rapidly developing field, and it has expanded from adopting CALL activities, such as grammar drills, to supporting multimedia, cooperative activities in different modalities, and learners’ co-constructed knowledge (Kukulska-Hulme and Shield 2008: 283).

Even though MALL has numerous advantages in terms of portability and availability of mobile devices, easy access to learning materials, ubiquitous nature of learning, immediate feedback possibilities, support for cooperative learning as well as increased student motivation, the dependence on the Internet and the small size of the screen are potential disadvantages (Gafni et al. 2017: 304-305). It is indeed a crucial point that not everyone has Internet access anywhere and anytime, and that mobile phone screens can be rather small, but these are not sufficient reasons to disregard the great potential that MALL has to offer. Indeed, routers and hotspots can be used to solve the Internet access problem, and the size of the mobile phone screens has tended to increase, not to mention that considerably bigger tablet computers can be used as mobile devices.

In order to help language teachers to make sense of the ever-increasing possibilities that MALL can afford, Kukulska-Hulme et al. (2015) published a research-based mobile pedagogy guide, aimed specifically at English language teachers. In this guide, the authors present a comprehensive pedagogical framework for MALL, where “enacting a mobile pedagogy means considering pedagogy in relationship with the other three spheres of the framework” – device features, learner mobilities and language dynamics (Kukulska-Hulme et al. 2015: 8). The sphere of devices includes different technological features that enable multimodal communication, cooperation and language rehearsal; learner mobilities comprise the aspects of time and place for learning, already discussed above; and language dynamics refers to the dynamic and ever-changing nature of languages that can be approached via new channels and media (ibid.). This guide is a highly reliable and practical source for language teachers interested in experimenting with mobile pedagogy. In addition to introducing the framework, it includes hands-on activities and a long list of different apps suitable for English language teaching and learning.

MALL resources can be categorized as mobile materials, such as websites or apps, and mobile activities that are designed around these websites or apps – they both can be either dedicated to learning or more generic in nature (Reinders and Pegrum 2015). In this study, the focus is on mobile apps and mobile activities dedicated to language learning, as playing a mobile game on an app in order to practice two target languages cooperatively in groups belongs to both categories.

Different frameworks have been developed for evaluating educational apps and other mobile resources. In the general framework by Hirsh-Pasek et al. (2015) that is also applicable in the MALL context, the criteria of active, engaged, meaningful and socially interactive learning constitute the four pillars of learning, and an app is considered educational rather than merely entertaining when it scores high on these properties within an educational context of a clear learning goal and scaffolding towards it. Scaffolding is a “process that enables a child or novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts” with the help of an expert, i.e. a more knowledgeable person (Wood, Bruner and Ross 1976: 90). Furthermore, due to scaffolding, the novice learner will be able to accomplish the same task on his or her own later on (Wood et al. 1976: 96).

Several researchers have developed evaluation criteria specifically for mobile language learning resources. Reinders and Pegrum's (2015) framework for evaluating MALL resources is especially noteworthy because it has previously been applied by Kukulska-Hulme and Viberg (2018), who are prominent researchers in the field, when evaluating MALL studies with a focus on cooperative learning and foreign or second language learning in their review article. However, as the focus of the current study is on the students' perceptions, it is assumed that the quality of the *School Detectives* game as an educational mobile resource will become evident in their reflections to a sufficient degree. For this reason and due to space limitations of the present paper, Reinders and Pegrum's (2015) framework will not be discussed in more detail here. Next, I will elaborate on previous MALL studies with a focus on mobile games and apps.

### **2.2.2 Previous MALL studies**

Gafni et al. (2017) studied how the use of the free MALL application *Duolingo* influenced learners' attitudes to learning in voluntary and mandatory environments in Israel. The study included two participant groups who used the app in parallel with attending a face-to-face foreign language course: the first pool of participants used the *Duolingo* app voluntarily (N=58, age 14–34+), whereas the other group used it mandatorily (N=31, age 14–18) (Gafni et al. 2017: 307-308). The study was conducted by using questionnaires (Gafni et al. 2017: 309). The results of the study indicated that the participants found *Duolingo* useful as a supplement to attending regular classes, i.e. as “the mobile learning assistant”, because it was easy to use and it enhanced learning (Gafni et al. 2017: 312). The findings also pointed out that the use of *Duolingo* had several advantages and disadvantages. The advantages included the ubiquitous nature of the app (portability, usability anywhere and anytime), self-learning (learning independence, easy access to materials, self-testing and immediate feedback), and the gaming aspect that stimulated learning and made it more enjoyable and interesting (ibid.). On the contrary, dependence on Internet access was considered a major disadvantage, whereas a noisy environment and distractions caused by other features of the mobile device were regarded as minor disadvantages (Gafni et al. 2017: 312-313).

The main difference between the mandatory and the voluntary populations in the study was that participants in the voluntary sample ranked the advantages more highly than the participants in the mandatory group: “They found *Duolingo* easier and simpler to use, more enjoyable, with greater improvement in the learning process” (Gafni et al. 2017: 313). Gafni

et al. (2017: 315) recommend enhancing learning in a traditional face-to-face course with mobile learning, but one should take into consideration that the participants' perceptions of MALL resources might depend on whether their use is mandatory or voluntary. However, a somewhat cautious stance should be taken in terms of generalizing these results. First of all, one should be a little critical regarding the comparability of the two participant populations in the study, because it is not specified which foreign languages the participants in the voluntary group were studying or for how long they used the app. The mandatory group used the app for one week in their French classes (Gafni et al. 2017: 307-308). Essentially, studying any other foreign language in the voluntary group might in itself have influenced the results, for example in terms of more positive attitudes towards that language. Moreover, it remains unclear why the mandatory participants were required to lack previous experience of using MALL, whereas the voluntary participants needed to have previous experience of using *Duolingo* (ibid.). It seems logical that one's perceptions are more positive towards a familiar app than towards an unfamiliar app.

*Duolingo* was also used in Rachels and Rockinson-Szapkiw's (2018) study which showed that students can learn equally well through the use of the *Duolingo* app as through traditional face-to-face instruction. The study was conducted in the USA over a 12-week period by using pre-tests and post-tests in the control group (N=88) and the treatment group (N=79), both of which were third and fourth grade students learning Spanish as L2 and had English as L1 (Rachels and Rockinson-Szapkiw 2018: 76-77). The authors encourage schools to consider using *Duolingo*, as it is freely available and research has indicated it to yield equivalent results to traditional teaching, but they do not take stance on whether it should be used solely instead of face-to-face teaching or not (Rachels and Rockinson-Szapkiw 2018: 86). This might be interpreted so that using *Duolingo* is a potential way of supplementing traditional face-to-face instruction with mobile learning, which is similar to the arguments of Gafni et al. (2017: 312) discussed above, as they found *Duolingo* to be a useful supplement to regular classes and encouraged it to be used as "the mobile learning assistant".

Furthermore, Kétyi's (2015) research on the implementation of the MALL app *Busuu* for studying four different foreign languages (German, English, Spanish and Italian) in the Hungarian higher education context revealed that the use of the app was beneficial to the students' learning. The post-test results showed that the increase in the experimental group's (N=51) performance was statistically significant as compared to the control group (N=43)

after using the app for eight weeks in addition to attending regular lessons (Kétyi 2015: 307-308, 310). However, the author points out that even though the app had a positive impact on the students' language skills, and it worked well on the mobile devices, the participants spent relatively little time using the app, and they were reluctant to continue using the app after the trial period due to its cost (Kétyi 2015: 310). Furthermore, the participants perceived the app as providing only limited help with the language skills (ibid.). Thus, it is of utmost importance not only to consider the results of pre- and post-tests in terms of language proficiency, but also to take into consideration the students' perspective and how they personally feel about using the app as part of their language learning journey.

The potential of MALL, especially in terms of apps, has been acknowledged worldwide, which is evident in the ever-growing amount of research on the topic. Before moving on to discussing examples of MALL studies concerned particularly with the implementation of location-based augmented reality (AR) mobile games for language learning, and prior to describing ARIS as a suitable platform for creating such mobile games, I first want to refer to a rather big-scale ongoing research project called ILOCALAPP that focuses on informal and incidental learning through MALL in Europe. ILOCALAPP stands for “Incidentally Learning Other Cultures And Languages through an APP”, and the aim of the project is to aid ERASMUS mobility students in integrating into the new environment and in improving their language proficiency in the local language of the destination: “The ILOCALAPP project will face this challenge by developing an app for the incidental learning of 4 cultures and languages: Finnish, Italian, Polish and Portuguese” (ILOCALAPP 2019). The app is called *UniOn!* and it has already been launched, which means that all its four versions for the different countries are downloadable. Unfortunately, the results of the research project are not yet available, as the project is still ongoing. Nevertheless, the project is such a prime example of MALL in the European context that it was worth introducing it here, especially as Finland is one of the partner countries.

### **2.3 Location-based AR mobile games for language learning**

Location-based<sup>1</sup> augmented reality (AR) mobile games “aim to engage students in an array of experiences that combine real landscapes and other aspects of the physical environment with contextualized digital information supplied to them via mobile devices” (Cervi-Wilson and

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<sup>1</sup> The term *place-based* is used often as a synonym to *location-based* in the literature

Brick 2018: 50). In essence, the AR technology combines digital sources such as images with real world spaces, which enables blending reality with virtual environment (Taskiran 2018: 892). Location-based mobile games make it possible to connect learning with physical places in the local environment, which can be done for instance by using geolocation through Global Positioning System (GPS) or attaching Quick Response codes (QR codes) to specific places.

Location-based games can potentially contextualize the learning experience. Learners can be exposed to language learning “in the wild”, which is “a metaphor to refer to the complex and contingent nature of L2 speakers’ social interactions outside the classroom” (Lilja and Piirainen-Marsh 2018: 2). Furthermore, educational location-based games are beneficial also in the sense that they increase engagement (CASLS 2018: 1), enable learning through exploration and cooperation, provide access to contextualized information, and increase motivation to learn (Melero, Hernández-Leo and Manatunga 2015: 377).

Previous research has shown AR to be beneficial for learning in the context of mobile game-based language learning. First of all, AR facilitates learning by making the learning tasks enjoyable and by increasing engagement as well as motivation (Taskiran 2018: 893). Taskiran (2018: 896) speculates that as learners are increasingly motivated to learn when using AR features, these apps and games may have the potential to reverse possible negative attitudes towards language learning and even blend formal and informal learning. Perry (2015: 2309) highlights that one of the benefits of AR is that it allows the teacher to bring authentic language environments virtually to the students when taking students there physically is not feasible. Furthermore, AR has the potential to create an immersive environment that in turn can establish relevant learning experiences, as was documented in Perry’s study (2015: 2314, see further in the next section). Thus, it can be concluded that location-based AR games create opportunities for meaningful and authentic language learning and facilitate it by increasing students’ motivation and engagement.

In contrast to the more general mobile game apps, such as *Duolingo* (see section 2.2.3), it seems that studies on location-based AR mobile games have not used readily available games, as the specific games have been created for the purposes of the research projects. Mota, Ruiz-Rube and Arnedillo-Sánchez (2018) created an app called *WerBinIch* for learning German as a foreign language on VEDILS that they consider a low entry threshold tool for teachers to create apps with AR features. Similarly, Cervi-Wilson and Brick (2018) report on how an

Italian language learning game called *ImparApp* was created within a university learning context by using TaleBlazer, an authoring tool for creating location-based AR games. However, these require some programming knowledge on the part of the game developer. As Mota et al. (2018: 250) note, “lack of programming skills is often a barrier to the engagement of teachers in the development and customisation of their own applications”.

On the contrary, the use of AURASMA or ARIS as authoring tools for creating location-based AR games does not require any prior programming knowledge. Taskiran’s (2018) study in the university setting in Turkey was accomplished by creating four different AR games for learning English as a foreign language by using AURASMA. Similarly, Richardson (2016) used AURASMA to create *Mission not really Impossible*, a location-based AR game developed for advanced learners of English as a foreign language in a university context, with the aim of completing challenging language tasks, while moving around a local city in Germany. Furthermore, ARIS has been used in numerous previous location-based AR studies for language learning, and as the game used in this research was also developed by using the ARIS platform, ARIS and prior research on it deserve to be discussed in depth in the next section.

## 2.4 ARIS

The acronym ARIS stands for Augmented Reality for Interactive Storytelling, but the platform is much more versatile than a tool for simply creating AR games. ARIS was chosen as the game development platform in this research project for a variety of reasons. First of all, it does not require any programming skills and it is free to use. Furthermore, ARIS is a reliable tool as it is being developed and maintained by an interdisciplinary research team called Field Day, based at the Wisconsin Institute for Discovery at the University of Wisconsin-Madison in the USA. Moreover, ARIS has been used in previous research rather widely: it was logical to choose a tool that has already been proven to function well for MALL purposes. In this section, I will first introduce the basics of ARIS and then elaborate on some of the previous MALL studies using it.

ARIS consists of three pieces of software – client, editor and server. Client refers to the app that works solely on iOS devices and makes it possible for the user to access and play games that have been created in the editor, which is “a web-based, drag and drop authoring tool for making games” (Holden 2015: 68). The client and the editor are connected to the third

component, i.e. the server, which is a database for storing game contents (ibid.). This is to say, in order to create or play games on ARIS, one needs to have access to the Internet. ARIS is suitable for designing tours, interactive stories, scavenger hunts, geolocational games, and data collection activities (Holden 2015: 74).

Due to space limitations of this paper, an overview of the basic elements of ARIS, i.e. objects, locations, notebook and quests, cannot be outlined here (however, see section 5.2.2.1 for examples in the designed ARIS game). To gain a deeper understanding of ARIS, the reader is advised to refer to the ARIS Manual (<https://manual.arisgames.org>) and online courses (<https://fielddaylab.wisc.edu/courses/>), as well as to other extensive introductions into the topic, such as Perry (2018) and Holden (2015). Furthermore, the Center for Applied Second Language Studies (CASLS) at the University of Oregon has published a hands-on document on the use of ARIS in the classroom, which includes an introduction to digital games and location-based learning in general, presents examples of how teachers have used ARIS in their classrooms (accompanied with readily available handouts and other activities), and elaborates on how students may be involved in building games (CASLS n.d.: 3). The abundance of guides and other resources is hoped to encourage teachers and researchers to explore the immense potential that ARIS has to offer for MALL.

Even though the use of ARIS is not limited to the educational domain in general, it holds a considerable potential especially for language learning and teaching. Perry (2018: 339) points out that ARIS enables the use of different language skills (reading, listening, writing and speaking), while also allowing a focus on culture and L2 pragmatics. The convenient nature of ARIS with regard to language teaching and learning is also evident in the sense that “the author can create content, include external links, and upload media in any language they choose (this also applies to player created content in games, e.g., notes, video recordings, and audio recordings)” (Perry 2018: 336), making it the game author’s responsibility to design suitable language learning goals into the game (Perry 2018: 337). Thus, it is not surprising that previous MALL studies have made use of ARIS. Next, I will discuss two pivotal MALL studies that report on the use of location-based AR games on ARIS for language learning purposes.

Holden and Sykes (2011) were the first to utilize the full potential of MALL in terms of place, ubiquity and personalization of the learning experience, as they used ARIS to develop

*Mentira*, which is “the first place-based augmented reality mobile game for learning Spanish” (Holden and Sykes 2011: 1). More specifically, *Mentira* engaged university students in the USA in solving a fictional murder mystery in a Spanish-speaking local neighborhood, while learning Spanish as a foreign and second language (Holden and Sykes 2011: 6). The game consisted of two main sections: the first part was played individually anywhere and anytime as homework, whereas the second part was played in the local neighborhood in small groups of three to five for a couple of hours – the idea was to visit certain locations to get clues on how to solve the mystery (Holden and Sykes 2011: 7). *Mentira* was implemented in three separate iterations, involving altogether 68 students from four classes (ibid.). The data consists of participant observation, game-play data, classroom products, surveys, and individual interviews (Holden and Sykes 2011: 9).

The results of the study indicate that the location-based AR nature of *Mentira* contributed to engaging the students with the local Spanish-speaking context in order to learn Spanish (Holden and Sykes 2011: 12). Moreover, the students had very different interactional patterns in terms of language use in the local neighborhood, ranging from using Spanish only for the purposes of progressing in the game to using Spanish as much as possible and resorting to English only if needed, which the authors interpret so that *Mentira* facilitated meaningful use of the target language beyond the textbook and classroom (Holden and Sykes 2011: 13). *Mentira* was not a disconnected add-on to the Spanish curriculum, but rather an integral part of the classroom experience (Holden and Sykes 2011: 7). Some parts of the game were done in the classroom, including solving the mystery cooperatively in class based on the collected cues (Holden and Sykes 2011: 8-9). Moreover, the game-play replaced one of two oral presentations required for passing the course (Holden and Sykes 2011: 8).

Inspired by *Mentira*, Perry (2015) developed the first place-based AR game for learning French as a second language, called *Explorez*, which transformed the local university campus in Canada into a virtual French-speaking world. *Explorez* is a quest-based virtual treasure hunt game where the player acts as a personal assistant to a famous French celebrity, whomever the player wishes to choose (Perry 2015: 2310). The game was designed to accommodate some of the learning goals of the course curriculum, and thus participating in the game-play replaced some compulsory French language workshops (Perry 2015: 2311, refer to section 2.1 for further information about the participants, data, and methods of the study). The findings suggested that the participants regarded the AR-enhanced learning

environment as relevant (Perry 2015: 2314). This is important in terms of place in location-based games. As discussed above, Holden and Sykes (2011) created a meaningful and engaging learning experience in a local real-world location (i.e., in the Spanish-speaking neighborhood), but Perry's findings indicate that a real-world environment where the target language is not naturally used can also be transformed into a relevant learning context with the target language virtually present in this environment. Making the real-world language learning context relevant by virtual means is the approach adopted also in this study. Moreover, Perry (2015: 2313) noted a sociocultural learning effect, as more advanced students helped others with the quests or the game system by giving the needed words or other information. Importantly, *Explorez* was the first game Perry ever created, and she encourages people interested in games and language learning not to feel intimidated by the technological aspect, but to be determined and try it out (Field Day Lab 2016).

Although ARIS has a great potential to offer for MALL, it is not flawless. The first problem in the school context arises as the ARIS app is only available for iOS mobile devices, which is problematic if Android devices are a majority or the only resource in the school. However, it is very likely that at least some students have iPhones, and thus ARIS could be played in groups by sharing these resources. Another drawback is the requirement of Internet access, but there are solutions available also for this problem: Holden (2015: 69) suggests that Internet connection could be provided to multiple devices in areas lacking Wi-Fi-connection by using portable routers. This tends to be more problematic when using iPads without cellular data and when playing outdoors, as most mobile phone contracts tend to include data, and as Wi-Fi tends to be provided indoors in schools. A third weakness is that ARIS lacks some of the functionalities that are generally appreciated in the context of education: for example, ARIS does not include a template for administering quizzes or creating student progress reports (Holden 2015: 78). However, this should not be considered a major hindrance to using ARIS, as no resource can include all possible useful features, and there are plenty of other resources for these other functionalities. All in all, ARIS is extremely well-suited for MALL, despite its minor shortcomings.

To conclude this section, game-based learning was chosen as one of the main approaches in the present study in contrast to gamification or game-enhanced learning, because the activity was a genuine game, as opposed to applying game elements to a non-game activity, and the game was developed specifically for the purposes of language learning, instead of using a

game not developed for this purpose, respectively. Another main approach was mobile-assisted language learning (MALL) due to its focus on mobile technologies. The use of apps and mobile games in language education has primarily been approached from the perspective of supplementing traditional face-to-face courses with mobile learning (see e.g. Gafni et al. 2017, Holden and Sykes 2011, Perry 2015). Furthermore, many MALL studies have employed location-based AR games, as their characteristics are known to enhance student engagement and motivation, as well as to contextualize the learning experience. In essence, ARIS is a widely used and feasible platform and app for doing this. The discussion thus far has presented two of the three main components of the key term coined for this study, and thus the role of game-based language learning and MALL should be clear in *mobile game-based cooperative language learning*. In order to shed light on the third component of the term, cooperative learning will be discussed next.

### 3 COOPERATIVE LEARNING

Cooperative learning (CL) is a pedagogical approach that emphasizes the active role of students in the learning process through cooperation in small groups. On the micro level, it is a set of different methods and techniques in the classroom that have been used in Finland since 1980's and elsewhere already since the 1960's (Hellström, Johnson, Leppilampi and Sahlberg 2015: 12). However, cooperative learning can also encompass broader levels: on the meso level, it can be applied in school-internal development and management, on the macro level, cooperative methods can be used in local and national school politics, and finally, it can be applied on the global level in the context of international cooperation (ibid.). In this study, cooperative learning will be discussed on the micro level as a set of principles incorporated into a mobile game activity for foreign language learning. In the following, I will define the term *cooperative learning*, elaborate on its five main elements, and discuss some of its advantages as well as its theoretical foundation.

#### 3.1 Terms and definitions

In general, two main terms are used in the literature, *cooperative* respective *collaborative* learning, and they have also been compared to *group work*. The third alternative is a rather broad concept, as group work refers to a number of students who work together, but they do not necessarily do this cooperatively (Woolfolk 2004, as quoted by Lin 2015: 19).

Cooperative and collaborative learning are often used interchangeably as synonyms (Kukulska-Hulme and Viberg 2018: 209), but sometimes they are contrasted with each other. For example, Panitz (1999: 3) differentiates between them as follows: "[c]ollaboration is a philosophy of interaction and personal lifestyle where individuals are responsible for their actions, including learning and respect [of] the abilities and contributions of their peers", whereas cooperation is defined as "a structure of interaction designed to facilitate the accomplishment of a specific product or goal through people working together in groups". However, when taking into account the four levels of cooperative learning suggested by Hellström et al. (2015: 12) above, it is clear that cooperative learning is more than a mere structure of interaction, and it can be seen as a philosophical orientation to interaction as well. Thus, Panitz's (1999: 3) definition of collaboration as a philosophical dimension can be subsumed within cooperative learning. Moreover, Panitz (1999: 3) points out that both terms share the same underlying constructivist epistemology in that students are perceived as actively constructing their own knowledge instead of learning passively.

The terms have been defined differently also based on many other variables, such as student-respective teacher-centeredness, degree of structural organization, and proper target group. Some have claimed cooperative learning to be more teacher-centered, structured and suitable for young students, whereas collaborative learning has been claimed to be more student-centered, less structured and mainly suitable for older students (see e.g. Panitz 1995, Oxford 1997, Bruffee 1995). However, one should be critical of these claims because these sources with rather radical views date back over two decades, and thus they can be estimated not to present the most updated view on the topic. Furthermore, I could not find any recent publications that would be in line with these sources. Moreover, cooperative learning is known as a student-centered approach in general (Tran 2013: 109). Thus, the terms *cooperative* and *collaborative* learning are considered synonyms.

The term *cooperative* learning will be used in this study because the two focal researchers in the field, David and Roger Johnson, have used the term in their extensive work (see e.g. Johnson et al. 1994, Johnson and Johnson 2008, Johnson and Johnson 2009, Johnson and Johnson 2015), and their contributions to the field have largely been taken as a starting point in this paper. Moreover, the Finnish term 'yhteistoiminnallinen oppiminen' tends to be translated as cooperative learning in the literature (Hellström et al. 2015: 6). The term will be adopted when citing different sources from now on, also when *collaborative* learning has

been used in the original source synonymously with or without being differentiated from cooperative learning. In this study, cooperative learning is defined as "the instructional use of small groups so that students work together to maximize their own and each other's learning" (Johnson and Johnson n.d.).

To avoid oversimplification, it is crucial to point out that there are different approaches within cooperative learning itself. To begin with, Kagan (1989: 12) introduces the structural approach to cooperative learning, which "is based on the creation, analysis, and systematic application of *structures*, or content-free ways of organizing social interaction in the classroom" (emphasis in the original). A fundamental feature of this approach is the difference between structures and activities, the latter of which have clear content-bound objectives and they cannot be utilized widely across different themes (ibid.). On the contrary, structures are building blocks that can be adapted to various content and cooperative situations, and they can even be built on one another to create multistructural lessons. Examples of well-known cooperative structures are jigsaw, think-pair-share, and group investigation, and it is important to point out that they have been adapted and used as different variations over the years (ibid.). As Sahlberg and Sharan (2002: 11) point out, cooperative learning is often considered in terms of the jigsaw structure in Finland.

Another important distinction between different cooperative methods concerns direct and conceptual approaches, as cooperative learning methods can be placed on a continuum from direct towards conceptual. According to Johnson, Johnson and Stanne (2000), direct methods are specific, easy-to-learn techniques that can effortlessly be implemented on specific subject content, but they cannot easily be adapted to changing contexts. On the contrary, conceptual methods encompass conceptual frameworks that teachers internalize as a template to be used across a variety of teaching contexts – they tend to be more challenging to learn and use in the beginning, but they are highly adaptable to different teaching domains once internalized (ibid.). This relates to Kagan's (1989) structural approach in the sense that the structures can be classified as either direct or conceptual. The results of the authors' meta-analysis revealed that conceptual methods, such as group investigation, facilitate higher learner achievement than direct methods, such as jigsaw (Johnson et al. 2000).

There are three main types of cooperative learning: formal and informal cooperative learning as well as cooperative base groups. They all have in common the five key elements that

constitute the cornerstones of any cooperative activity (Johnson and Johnson n.d., see further in section 3.2). In formal cooperative learning, students work in cooperative groups to attain shared learning goals and to complete assignments and tasks, which can last for one class period or up to several weeks (Johnson et al. 1994: 36). Furthermore, Jolliffe (2007: 43) emphasizes that effective formal cooperative learning groups require team identity, certain social skills to be practiced, evaluation of group work and learning, and teacher monitoring and support. The teacher's role in formal cooperative learning includes deciding on the group size and division, explaining the task and learning objectives, monitoring the students' work and assisting as needed, and guiding the students through group processing (Johnson et al. 1994: 37). On the contrary, informal cooperative learning makes use of temporary groups that last only for a short term, from a couple of minutes to a whole lesson (Jolliffe 2007: 43). For instance, they can be used to make students actively focus on and process the learning material, or to identify and correct misunderstandings and gaps, especially during direct teaching (Johnson et al. 1994: 49). Cooperative base groups are heterogenous long-term cooperative groups with stable membership, lasting often for a term or a whole year (Jolliffe 2007: 43), and their main task is to "help students provide each other with support, encouragement, and assistance in completing assignments and hold each other accountable for striving to learn" (Johnson et al. 1994: 53). Johnson et al. (1994: 59) emphasize that the three different types of cooperative learning can be used together as a mixture in class. The cooperative setting in this study is situated within formal cooperative learning.

The current study involves a cooperative activity, and it is thus situated on the micro level of formal cooperative learning. More specifically, the activity consists of playing a mobile game cooperatively in groups in order to practice English and Swedish. This study does not make use of any particular structure, as the readily available cooperative structures were deemed too robust and inflexible to be applied in this particular setting. However, I would still regard this approach as conceptual rather than direct, as I have developed the mobile game and designed the playing setting by applying the five main elements of cooperative learning (see the next section 3.2), which are built-in in nearly all structures by default (Kagan and Kagan 2002: 39). In other words, instead of implementing an easy and simple cooperative method directly, I have internalized the general framework of the five main principles and applied it to this unique context that lacked a-priori suitable structures. Indeed, I would argue that this is a rather sophisticated level of conceptual cooperative methodology. Next, I will discuss the five underlying principles of cooperative learning in detail.

### **3.2 The five key elements**

Effective cooperation in any group activity requires fulfilling the five main principles of positive interdependence, individual accountability, promotive interaction, interpersonal and small group skills, and group processing (Johnson et al. 1994: 26). Theorists have conceptualized the essential components of cooperative learning somewhat differently over the years, but as most authors have a shared understanding of these five elements, they have become firmly established (Doolittle 1995: 7-8). The principles may be named a little differently depending on the author, but they still describe the same phenomena. For example, promotive interaction is sometimes described as face-to-face interaction (see e.g. Jolliffe 2007: 40). In the following, each key element will be introduced.

#### **3.2.1 Positive interdependence**

Positive interdependence is the most crucial element of cooperative learning, as cooperation cannot exist without it (Johnson and Johnson n.d.). It results in the so called "sink or swim together" effect, which means that it is impossible for individuals to succeed unless the whole group succeeds, and vice versa (Johnson and Johnson n.d., Jolliffe 2007: 40, Gillies 2007: 33). Practical means of establishing positive interdependence have been categorized somewhat differently by various authors, but in essence the contents are the same. According to Jolliffe (2007: 40), some ways of structuring positive interdependence are mutual group goals, joint rewards, shared material and information, and assigned roles. These correspond to the three-fold classification of interdependence into the categories of outcome, means, and boundary, presented by Johnson and Johnson (2009: 367). It has been established that a combination of different types of interdependencies is effective in improving students' achievement. A combination of goal and reward interdependence (i.e. outcome interdependence in Johnson and Johnson 2009) improves students' achievement more than goals alone, and goal interdependence is needed in addition to resource interdependence in order to promote achievement (Johnson et al. 1994: 29; Johnson and Johnson 2009: 367).

There are various practical ways of establishing the different kinds of interdependencies. An example of group goals is instructing students to make sure every group member has learned the material, which can be supplemented by joint rewards such as bonus points for each individual, if the group members' average test score is good enough (Jolliffe 2007: 4, Johnson et al. 1994: 28). Means interdependence includes shared material and information as well as assigned roles in Jolliffe's (2007: 40) categorization, and it can be established by dividing

resources to individual group members to be shared with others, piecing the task at hand in order to make each member responsible for a specific aspect of it, and assigning students to different roles such as reader, encourager or summarizer (see also Johnson and Johnson 2009: 367). Furthermore, the students can be assigned social roles or roles concerned with accomplishing the task, i.e. roles used to practice and learn social skills or roles used to enhance working on the task at hand, respectively (Sahlberg and Leppilampi 1994: 118). According to Johnson and Johnson (2009: 367), boundary interdependence can be classified in terms of outside enemy, environment, and identity: enemy interdependence results in negative interdependence with another group (i.e. competition), environmental interdependence may be realized through a particular work area, proximity of seating, or similarity for instance in clothing, and identity interdependence "binds group members together as an entity". Identity interdependence can also be created by using a name or a motto (Johnson et al. 1994: 28, Jolliffe 2007: 41). Moreover, the authors present a further category that is not present in the three-fold classification: fantasy interdependence that is established by requiring group members to imagine them to be in a hypothetical situation (ibid.).

### **3.2.2 Individual accountability**

Individual accountability is another key element of cooperative learning, and the idea is that each member of the group is held responsible for contributing to the group's overall success (Johnson et al. 1994: 30). Gillies (2007: 39) points out that in addition to doing one's share of the work, group members also monitor that others complete their responsibilities. Individual accountability has also been characterized as "the degree to which the achievement of the group is dependent on the individual learning of all group members" (Tran 2013: 103). Individual accountability can be structured for example by using individual tests or asking one member per group at random to answer on behalf of the whole group after the activity (Jolliffe 2007: 40). Moreover, small group size enhances individual accountability (Johnson et al. 1994: 31, Tran 2013: 103, Johnson and Johnson 2009: 368). Furthermore, Johnson et al. (1994: 31) encourage teachers to have students teach what they have learnt to their peers. In essence, individual accountability is crucially needed to ensure that all members of the group actually benefit from cooperative learning (ibid.), which can be accomplished through the following pattern:

There is a pattern to cooperative classroom learning – students learn together and then perform alone. They first attain knowledge and skills and learn strategies and procedures in a cooperative

group. They then apply the knowledge or perform the skill, strategy, or procedure alone to demonstrate their personal mastery of the material. (Johnson et al. 1994: 31)

The lack of individual accountability runs the risk of distributing the work unevenly within the group, which means that some students may end up doing all the work, whereas others do not do anything (Johnson et al. 1994: 31). In other words, individual accountability ensures that each member is accountable for doing one's share instead of "hitchhiking" on other's work (Johnson and Johnson n.d.). Johnson and Johnson (2009: 368) point out that students have a tendency to hitchhike when identifying individual contributions is difficult, when these are considered redundant, or when all group members are not held responsible for the final outcome, which is called social loafing (see also Johnson et al. 1994: 30-31).

The term group accountability is often mentioned alongside individual accountability, and it can be established by assessing the general performance of the group as a whole (Johnson and Johnson 2009: 368). Archer-Kath, Johnson and Johnson (1994) studied individual and group accountability by comparing the effect of individual respective group feedback on 56 American 8<sup>th</sup> grade students' social skills, attitudes, relationships and achievement over 11 weeks and 14 lessons of German as a foreign language in heterogenous cooperative groups. The results indicated that individual feedback on social skills outperformed group feedback, as it increased the participants' engagement in using social skills, improved their intrinsic motivation as well as achievement in terms of mastery and knowledge of German language and culture, and reinforced more positive social relationships within the groups and more favorable attitudes towards German (Archer-Kath et al. 1994: 691-693). However, this is not to claim that group accountability per se would not be beneficial. Individual and group accountability are highly related to positive interdependence, as they rest on the notion of responsibility forces created by it – people feel responsible not only for their own share but also for the success of the whole group: "failing oneself is bad, but failing others as well as oneself is worse" (Johnson and Johnson 2009: 368).

### **3.2.3 Promotive interaction**

Positive interdependence provides the context for the occurrence of the third key element of cooperative learning, i.e. promotive interaction (Johnson et al. 1994: 29; Johnson and Johnson 2009: 368). Students facilitate each other's success and the achievement of the group's goals through promotive interaction as they help one another, exchange resources in terms of

information and materials, give feedback that can be used to improve subsequent performance, promote high-quality decision-making in terms of challenging each other's reasoning and conclusions, encourage one another to achieve joint goals, act in a trustworthy manner, and strive for a common benefit for the group, among other things (Johnson et al. 1994: 29-30, Johnson and Johnson 2009: 368-369, see also Gillies 2007: 36-37). Students need promotive interaction in order to "become personally committed to each other as well as to their mutual goals" (Johnson and Johnson n.d.). Tran (2013: 102) points out that the quality of interaction is affected by the academic level of each group member and the learning environment: every individual has to be aided in giving feedback to and supporting others in the group, and a positive learning environment needs to be created to facilitate effective group work in cooperation. Some salient cognitive activities and interpersonal dynamics can only occur in promotive interaction, preferably face-to-face, including oral explanation of problem-solving, discussing key concepts, teaching one's group members and connecting new knowledge with the past learning (Johnson and Johnson n.d.). Promotive interaction has positive effects also on skills such as oral summarizing, receiving and giving explanations, and elaboration (Jolliffe 2007: 40).

### **3.2.4 Interpersonal and small group skills**

The fourth integral element of cooperative learning concerns interpersonal and small group skills. Johnson et al. (1994: 32) note that cooperative learning necessitates engaging simultaneously in taskwork, which refers to learning the academic subject matter, and in teamwork, which is constituted of interpersonal and small group skills. Interpersonal and small group skills are fundamental for the group to function, and taskwork cannot be accomplished if teamwork skills are not mastered (*ibid.*). Furthermore, greater interpersonal and small group skills increase the quality and quantity of learning outcomes (*ibid.*).

The key is that students should not be assumed to master teamwork skills, but instead these skills must be purposefully taught, and the students must be motivated to use them (Johnson et al. 1994: 32, Johnson and Johnson 2009: 369, Jolliffe 2007: 40). The authors outline a set of important interpersonal and small group skills to achieve joint goals as follows: getting to know and trust one another, communicating clearly and straightforwardly, accepting and encouraging one another, and managing conflict situations in a constructive manner (*ibid.*). This list could be complemented with effective leadership and decision-making (Johnson and Johnson n.d.). Furthermore, Johnson et al. (1994: 64) posit that learning and internalizing the

skills greatly depend on the other members of the group: the teacher informs about the cooperative skills and encourages the groups to practice them, but "peer support and feedback determine whether the skills are used appropriately and frequently enough to become natural and automatic actions". Slavin (2011, as quoted by Tran 2013: 103) stresses that teamwork skills can be practiced and taught for instance through roles.

Interpersonal and small group skills can be situated on four levels from minimum basic skills needed to function as a group to higher-level skills that stimulate reconceptualization of the learning material (Johnson et al. 1994: 65). These four levels are known as forming, functioning, formulating, and fermenting skills. According to Johnson et al. (1994: 65-66), forming skills are the very basic skills such as staying with the group and encouraging every member to participate. Functioning skills are a step forward, as they are used to complete the assignment and maintain interpersonal relationships, for example by expressing verbal and nonverbal support to group members, asking for and offering help or clarification, and monitoring the task by paying attention to time limits (Johnson et al. 1994: 66). Skills at the formulation level are required to mentally process the material and build a deeper comprehension of it, ensure its mastery and retention, and activate higher-reasoning strategies (Johnson et al. 1994: 67). The authors suggest this to take place through different roles, such as summarizer, corrector, elaboration seeker, understanding checker, and explainer (ibid.). In the highest level, fermenting skills facilitate engagement in "academic controversies", as members of the cooperative group challenge one another's reasoning, which makes the students "dig deeper" into the learning material and enhances constructive arguments (Johnson et al. 1994: 68). Some of the required skills include criticism towards ideas instead of people, synthesis of ideas, and consideration of underlying disagreements in the group (ibid.). It is crucial to choose the skill level in accordance to the students' capabilities, and to explicitly name as well as exemplify the skills (Johnson et al. 1994: 68-69).

### **3.2.5 Group processing**

Finally, the fifth key element of cooperative learning is group processing. In essence, group processing means reflecting on how well the group has functioned (Johnson et al. 1994: 33), which is done to identify strengths and weaknesses within the group (Jolliffe 2007: 40) and to clarify how effectively the members have worked in order to attain the joint goals of the group (Johnson and Johnson 2009: 369). This can be approached from two points of view: on the one hand, group members reflect on what member actions were unhelpful or helpful, and

on the other hand, they decide on what actions they want to continue in the future and what to change (ibid.). It is relevant to ensure that feedback is directed also at the individual group members, as individual feedback has been found to be more effective than feedback directed at the whole group (Archer-Kath et al. 1994, as already discussed in section 3.2.2).

Group processing is beneficial for a number of reasons. First of all, it may cause the group members to work more as an attempt to compensate for the either real or imaginary shortcomings of others, which is known as the compensation effect (Johnson and Johnson 2009: 369.). Secondly, it can also diminish the danger of social loafing, as it shows each member's valuable contributions, and it also tends to make the group's joint goals clearer and the members more involved (ibid.). Moreover, reflection benefits the students by maintaining good interpersonal relationships, promoting teamwork skills, ensuring feedback, providing an opportunity to reflect on metacognitive and cognitive skills, and creating a chance to celebrate the success of the group (Johnson et al. 1994: 33).

Johnson et al. (1994: 33) have identified several fundamental principles of successful reflection in small-groups. Firstly, it is essential to give enough time for group processing. Secondly, the teacher should provide the students with a specific structure for reflection, such as listing a certain number of things that went well or should be improved. Thirdly, the teacher should highlight the importance of positive feedback and make the reflection specific in its nature. Finally, it is crucial to ask students to use their interpersonal and small group skills in the reflection process. Group processing may also be conducted as a whole class activity (ibid.).

To conclude, cooperative learning necessitates fulfilling the five key elements, namely positive interdependence, individual accountability, promotive interaction, interpersonal and small group skills, and group processing (Johnson et al. 1994: 26). Positive interdependence is the most important feature, as it creates the conditions for the use of the other elements. In this study, the five key elements have been taken into account in the design of the game-play situation (see section 5.2.2.2). Next, I will discuss some of the general advantages of cooperative learning based on its theoretical foundation.

### **3.3 Advantages of cooperative learning based on the social interdependence theory**

Students taught by cooperative learning methods have higher academic, social, affective and psychological results, as compared to students who have received non-cooperative teaching,

to which an explanation can be found within the theoretical background of cooperative learning (Tran 2013: 101). Due to space limitations, the broader history of cooperative learning as rooted within John Dewey's ideas of "learning by doing" and the active role of the learner (Hellström et al. 2015: 32), as well as within Vygotskian sociocultural theory (see for instance Doolittle 1995 and Brame n.d.), will not be discussed here. Moreover, the literature determines three to four different theoretical frameworks that are closely relevant to cooperative learning and explain its superior effectiveness as compared to individualistic or competitive approaches. Tran (2013) outlines three equally important theoretical models that complement one another – the social interdependence theory, the cognitive perspective, and the social learning theory. Johnson and Johnson (2015) adopt a slightly different approach as they present four theoretical models, namely the social interdependence, cognitive-development, social-cognitive, and behavioral-learning theories, but emphasize the social interdependence theory as the most useful theoretical foundation for cooperative learning.

Social interdependence theory is chosen as the main theoretical foundation for cooperative learning in this study for several important reasons. To begin with, it has generated most research and applications in terms of comparing cooperative with competitive and individualistic approaches and implementing cooperative learning in a myriad of educational levels (Johnson and Johnson 2015). As Johnson and Johnson (2015) put it, research that validates social interdependence theory has exceptionally high internal and external validity, as compared to most other theories. Furthermore, the social interdependence theory is significant also in the sense that it directly addresses positive interdependence, which is the most important element of cooperative learning (Johnson and Johnson n.d.). Due to space limitations and the aforementioned arguments for its usefulness, the discussion will be limited to social interdependence theory, while the relative importance of the other theories is acknowledged as well.

The social interdependence theory entails an important distinction between cooperative, competitive and individualistic approaches. According to Johnson and Johnson (2015), the fundamental tenet of social interdependence theory is that the nature of interdependence structured in an interactive situation affects how people interact with each other, and these interactional patterns create different outcomes. In essence, the social interdependence theory is based on three concepts – cooperation (positive interdependence), competition (negative interdependence), and individualistic efforts (no interdependence) (Johnson, Johnson and

Holubec 1991: 3:5). Johnson and Johnson (2015: 7) elaborate on these as follows. Positive interdependence exists when there is a positive correlation between individuals' goal achievements, i.e. when individuals can attain their goals only if their group members do so as well. Negative interdependence exists when individuals' goal achievements are negatively correlated: individuals compete with each other in the sense that an individual's beneficial attainment of goals is detrimental to others. Furthermore, there is a lack of interdependence when individuals can reach their goals irrespective of whether their group members achieve their goals or not.

Cooperative learning groups differ from non-cooperative ones in various aspects (see e.g. Johnson, Johnson, Holubec and Roy 1984: 9-10 and Hellström et al. 2015: 55), and these characteristics are embedded in the five key elements of cooperative learning, which in turn are reflected in the theoretical framework. As has already been outlined previously (see section 3.2), positive interdependence is the most important of the five key elements of cooperative learning (Johnson and Johnson n.d.), and it tends to result in an interactional pattern called promotive interaction, which is another main principle of cooperative learning (Johnson and Johnson 2015: 23). Promotive interaction exists when students "facilitate each other's efforts to learn" (Johnson et al. 1991: 3:5) for instance by helping and encouraging each other, giving one another feedback, and challenging one another's reasoning, with the aim of maximizing both their own and their group members' success (Johnson and Johnson 2015: 23). This can be contrasted with negative interdependence or the lack of it. Negative interdependence is connected to oppositional interaction where individuals discourage and even obstruct each other's efforts to accomplish their goals, whereas there is no interaction when people work independently (Johnson and Johnson 2015: 23, Johnson et al. 1991: 3:5, 3:7). Johnson and Johnson (2015: 23) point out that the relationship between the nature of social interdependence and the corresponding interactional pattern is bidirectional – one may cause the other.

There is an abundance of research-based evidence of the advantages of cooperative learning in contrast to non-cooperative learning, i.e. competitive or individualistic learning. Sahlberg and Sharan (2002: 13) generalize that cooperative learning can potentially yield better results in contrast to non-cooperative learning, provided that it has been conducted under feasible circumstances. Importantly, not all studies have found cooperation to be more beneficial or effective than non-cooperative methods, but these studies have broadly been criticized for not

specifying the type and duration of the used cooperative method, as well as for not addressing previous experience and expertise of cooperative learning held by the students or the teacher (see for instance Sahlberg and Leppilampi 1994: 86, Sahlberg and Sharan 2002: 13).

As Augustine, Gruber and Hanson (1989: 4) put it already three decades ago, "cooperative learning can benefit all students, even those who are low-achieving, gifted, or mainstreamed". research has shown that cooperative learning benefits low- and intermediate-achieving students most in terms of improved subject knowledge gains, while it benefits talented students most in terms of improving social and interactional skills, as well as their abilities for self-evaluation (Sahlberg and Leppilampi 1994: 83). The advantages of cooperative learning are often described in terms of promoting higher achievement, better psychological health, and greater social relationships (see for instance Augustine et al. 1989: 4, Johnson and Johnson 2015: 26, Johnson et al. 1991: 3:12, Saloviita 2015: 103-106, and Jolliffe 2007: 7). In the following, I will elaborate on each of these aspects.

Firstly, higher achievement in cooperative learning settings has been reported in terms of promoting positive attitudes to the task, being more engaged in the task by spending more time on it, being more involved in activities, and conducting less off-task and disruptive behaviors (Johnson and Johnson 2015: 25-26). Furthermore, higher achievement has also been addressed as increased productivity (Jolliffe 2007: 7, Johnson and Johnson 2008: 15-16), better long-term retention (Johnson et al. 1991: 3:14), and more high-level reasoning, i.e. critical thinking (Jolliffe 2007: 7, Johnson and Johnson 2008: 15-16, Johnson et al. 1991: 3:14).

Secondly, cooperative learning correlates also with different indicators of psychological health, such as self-esteem, social skills, and strategies for higher level cognitive and moral reasoning: "the more cooperative learning experiences in which students are involved, the more mature their cognitive and moral decision making and the more they will tend to take other people's perspectives into account when making decisions" (Johnson and Johnson 2015: 27). Other examples of improved psychological health include higher self-confidence, better independence, and greater resilience as well as ability to cope with hardships (Jolliffe 2007: 7, Johnson et al. 1991: 3:17).

Thirdly, Johnson and Johnson (2015: 10) exemplify that cooperative learning results in more positive interpersonal relationships by promoting higher interpersonal attraction and better social support among group members. Interestingly, the effects are stronger for peer support than for support given by the teacher (*ibid.*). Furthermore, the authors' meta-analysis found that cooperative experiences tend to diminish bullying and increase prosocial behavior (Johnson and Johnson 2015: 27). Similarly, Jolliffe (2007: 7) emphasizes that interpersonal skills are enhanced in cooperation by committing to relationships, establishing friendships, and having higher morale. Johnson et al. (1991: 3:16) have captured the importance of interpersonal relationships as follows: "The more students learn in cooperative groups, the more they like each other".

To summarize the current section, this study utilizes a conceptual approach to formal cooperative learning by applying its five key elements in a mobile game setting for language learning. In essence, the five key elements of cooperative learning, i.e. positive interdependence, individual accountability, promotive interaction, interpersonal and small group skills, and group processing, are needed for any activity to be cooperative (Johnson et al. 1994: 26). Positive interdependence is the most fundamental element, and as suggested by Johnson and Johnson (2015), the social interdependence theory is the most useful and validated theoretical foundation for cooperative learning, and this view is adopted also in the present study. Social interdependence theory takes into consideration the superior qualities of cooperative learning as opposed to competitive or individualistic learning, and it relates specifically to the five key elements. According to Johnson et al. (1994: 26), it is the five key elements that make cooperative learning more effective than competitive or individualistic learning. Some of the advantages of cooperative learning in contrast to competitive or individualistic learning are higher achievement, better psychological health, and greater social relationships, as outlined above. Having established the ground for cooperative learning in general, I will next discuss how cooperation can be combined with mobile game-based learning in the context of foreign language education.

## 4 COOPERATIVE LANGUAGE LEARNING (CLL) IN THE MOBILE GAME CONTEXT

Next, I will consider how this study is situated in an intersection between mobile game-based language learning and cooperative learning, which will be called *mobile game-based cooperative language learning*. The discussion is divided into three main parts: the first part describes mobile game-based cooperative language learning, the second focuses on students' perceptions of it, and the third illustrates how it is related to the National Core Curriculum for Basic Education (referred to as NCC 2016 in this study).

### 4.1 Mobile game-based CLL

Cooperative learning within the domain of second or foreign languages is known as cooperative language learning (CLL). As has been discussed earlier, cooperative learning is superior to individualistic or competitive learning (see section 3.3). As a case in point in the foreign language learning context, Yavuz and Arslan (2018) conducted a quasi-experimental study of Turkish 10<sup>th</sup> grade high school students of English (N=66) in order to compare the learning outcomes between the cooperative learning together method and traditional teaching activities. The results of the pre- and post-tests demonstrated that cooperative learning improved the students' English skills in terms of vocabulary, grammar, reading and listening more than the traditional teaching activities (Yavuz and Arslan 2018: 596).

Two recent reviews shed light on the current state of research focusing on mobile cooperative learning in general (Fu and Hwang 2018) and more specifically in the context of foreign language learning (Kukulka-Hulme and Viberg 2018). The review by Fu and Hwang (2018) reveals that mobile cooperative learning has attracted an increasing amount of research during the recent decade (2007–2016). Moreover, studies have predominantly been conducted in higher education contexts, which is why the authors call for more focus on the lower educational levels (*ibid.*). Importantly, research on mobile cooperative learning in the domain of languages grew tremendously by 600% during the second half of the decade, and this trend of increasing research interest is assumed to continue in the future (Fu and Hwang 2018: 135).

According to Kukulka-Hulme and Viberg (2018: 207), their review of mobile CLL studies published in 2012–2016 strongly indicates that the combination of cooperation and mobile language learning is beneficial. To begin with, the authors list a set of affordances that mobile

technologies potentially can facilitate in the cooperative learning setting: “flexible use, continuity of use, timely feedback, personalization, socialization, active participation, peer coaching, self-evaluation, sources of inspiration outdoors and cultural authenticity” (ibid.). Furthermore, Kukulska-Hulme and Viberg (2018: 211) stipulate that these affordances are prone to promote social constructivism through various general pedagogical approaches, such as game-based learning. In terms of pedagogical approaches concerning language education, task-based language learning, situated language learning, and the communicative approach have been widely used (Kukulska-Hulme and Viberg 2018: 213). The authors also point out that cooperative learning practices have often been combined with autonomous learning in the reviewed articles (ibid.). When it comes to second language acquisition principles, comprehensive input, comprehensive output, noticing, negotiation of meaning, and feedback (either automated or human) were identified as the core factors (ibid.). Moreover, Kukulska-Hulme and Viberg (2018: 215) suggest that the reviewed studies have emphasized game-play and problem-solving in task designs, integrated language skills and authentic communication, and enabled learning in diverse contexts, also outside of the classroom.

Previous studies have been conducted to investigate cooperative learning specifically in the mobile game context, in contrast to the broader field of mobile learning. Bressler (2015) designed a quest-based cooperative mystery AR game on ARIS called *School Scene Investigators: The Case of the Stolen Score Sheets* on the topic of forensic science. Altogether 68 middle school students played the game in groups of three to four one group at a time (Bressler 2015: 91). The cooperative design was achieved by using the jigsaw structure, which stipulated that group members needed information from each other in order to solve the mystery. This was achieved by assigning each group member a different role that functioned as an in-game identity (Bressler 2015: 89). Bressler (2015: 97) points out that the game did not set any content-specific learning goals, but rather was a mystery to be solved through cooperation. Furthermore, the author concludes that cooperation was enhanced during the game-play, and that even though not all students solved the mystery correctly, they all had a positive experience of well-functioning cooperation (Bressler 2015: 93). In addition, Bressler (2015: 98) observed empowerment among the students in the sense that they took control over their own learning, which led the author to argue that “[c]reating good games is a great way to empower students to learn”.

Some studies have also been conducted to address cooperative learning through mobile games in the specific domain of language education. The jigsaw method was used to solve a mystery cooperatively on ARIS also in Holden and Sykes's (2011) investigation of how a place-based AR mobile game called *Mentira* can promote learning Spanish. The specifics of this study have already been discussed in depth previously (see section 2.4), and thus they will not be repeated here.

In another study, Wong and Hsu (2016) designed a game for developing Singaporean students' orthographic awareness of Chinese characters. Each of the 9-year old participants (N=31) studying Chinese as L2 played the *Chinese-PP* game on a separate mobile device. They invited other players to form legitimate Chinese characters by combining their components with their peers' components, which led to meaning negotiations (Wong and Hsu 2016: 62). The authors attributed the eminent learning outcomes of the game-play to flexible grouping design, along with "the mobility of devices and participants, enjoyment of the game, [and] sense of achievement in winning the game and helping peers" (Wong and Hsu 2016: 75). Importantly, Wong and Hsu (2016: 73) emphasize that the game promoted learning from mistakes and learning by doing, as learning gains were improved even if the characters were not formed completely accurately in all cases. Even though forming Chinese characters is quite distant from learning to communicate in English or Swedish, the study by Wong and Hsu (2016) illustrates how cooperation can enhance language learning through mobile games. Furthermore, not being afraid of making a mistake in the language classroom is a vital mindset to be fostered by teachers, and thus using games that give the students an opportunity to make mistakes and learn from them (or despite of them) can be considered a significant asset in foreign language education.

It is important to take into account the distribution of mobile devices within the group in cooperative learning settings. Even though the research designs in the following studies were not deliberately cooperative, the results give important insights that should be applied also in cooperative game-play settings. Thorne et al. (2015) studied the interactional practices and artifact orientation of intermediate-level university students of English as a second language who took the role of agents from the future when using ARIS to play *ChronoOps*, a game that provides opportunities for language learning and reflection on environmental issues as well as an emphasis on green technology on campus in the USA. The authors gathered video-recorded game-play data of eight groups of three students (Thorne et al. 2015: 265), and they

summarized the results of the study as follows: “The stipulation that the activity be carried out by small groups using one device per group, rather than individuals each using a device, necessitated members' cooperation within their small groups” (Thorne et al. 2015: 281). The interactional effect of this was that all members in the group were oriented not only to the device but also to the person holding the device (ibid.).

Furthermore, Melero et al. (2015: 380) report that learning outcomes are higher when students have an opportunity to interact with the mobile app, in contrast to merely being a part of the group but not handling the device, and thus every member of the group should use the device to be more engaged and less distracted (see below for a closer description of their study). The authors called for further research focusing on the impact of sharing a mobile device in the group, in contrast to each student having their own device (Melero et al. 2015: 383), and by combining the results of these two studies, it can be concluded that having one shared mobile device per group that is used by all group members facilitates higher learning outcomes and promotes cooperation.

Another important aspect is the impact of group size on the mobile game learning experience. Melero et al. (2015: 384) studied the effect of group size on learning on the basis of 76 secondary school students who played a mobile game in an art museum in groups of three to five members. The data was gathered through observation, questionnaire and post-test, and the results indicated that bigger group size correlates with lower concentration level of students (ibid.). This is because students in bigger groups do not participate actively in agreeing on answers and they are more distracted (ibid.). Even though the authors did not specify the learning setting as cooperative and although the mobile game was not developed for language learning purposes, these findings can be considered relevant also in the CLL setting, as the preferable size of cooperative groups is known to be between two and four members (Hellström et al. 2015: 29). Furthermore, Fu and Hwang's (2018: 135) review revealed that research on mobile cooperative learning favored relatively small heterogeneous groups of two to three students per group, which seems to be a convenient group size in the light of the findings by Melero et al. (2015), as discussed above.

Next, I will define the term *mobile game-based language learning* as it is used in the current study. Fu and Hwang (2018: 130) emphasize the ubiquitous nature of mobile learning in their definition of mobile cooperative learning as “a learning approach using mobile devices and

wireless technology anytime and anywhere to achieve a certain learning target in a group”. However, this definition cannot directly be applied in the present study, as it overemphasizes the ubiquitous nature of mobile learning, underemphasizes the importance of cooperative group work, and leaves foreign language learning as the domain of interest unspecified. Rather, the following definition will be used in this study: mobile game-based cooperative language learning emphasizes the portable nature of mobile devices and their affordances to foreign language learning, while simultaneously employing the benefits of game-based learning and highlighting the importance of cooperation in groups. The affordances of active participation, peer coaching, self-evaluation, and cultural authenticity, as outlined by Kukulska-Hulme and Viberg (2018), are especially relevant in this study. In terms of the benefits of game-based learning, it is hoped that the game-based nature of the learning setting balances the subject content with game-play in an engaging and motivating way (Ghazal and Singh 2016: 2). Cooperation within the group is hoped to be achieved by designing the five key elements of cooperative learning (Johnson et al. 1994) into the mobile game-based learning setting. As Kukulska-Hulme and Viberg (2018: 210) point out, teachers can design cooperation into a task by using an appropriate mobile platform, and this was taken into consideration when designing the mobile game *School Detectives* on the ARIS platform.

#### **4.2 Students’ perceptions of mobile game-based CLL**

It is inevitable to consider both teachers’ and students’ perceptions of CLL, as they both contribute to the success of cooperative learning and teaching: teachers plan and facilitate CLL tasks, and students’ attitude as well as engagement affect their learning outcomes (Sun and Yuan 2018: 189). However, prior research on teachers’ perceptions will be presented very briefly here, as the students’ perspective is in the focus of this study. Sun and Yuan (2018: 198) found out that foreign language teachers (N=32) perceived CLL strategies positively irrespective of the target language (Chinese, French or German) in a university setting in the USA. In the context of Finland, Pitkäranta (2000) interviewed 11 teachers of English and German as foreign languages, and the results indicated that the teachers perceived cooperative learning rather positively and some had employed it occasionally, despite of having relatively vague theoretical and practical knowledge of cooperative learning and associating it mainly with the jigsaw method.

Sun and Yuan (2018) researched university students’ (N=136) perceptions of CLL strategies in beginner-level courses of Chinese, French and German as foreign languages in the USA.

The results of the study showed that in general, the students perceived CLL strategies positively irrespective of the specific target language (Sun and Yuan 2018: 198). However, the students' perceptions were not unanimous, and the researchers speculate that this might be explained by their different proficiency levels in the target language – complete beginners tended to prefer simple pair work, while a bit more advanced beginners were prone to prefer more challenging strategies such as interviews (ibid.). Research evidence on students' perceptions of CLL in Finland is scarce. Zhang's (2015) study of how Chinese university students (N=10) across different fields perceived cooperative learning in Finland seems to be the closest alternative. The interview results showed that cooperative learning was seen as a useful method to promote motivation, learning and socialization (ibid.). However, the focus was generally on cooperative learning, not on CLL, and the participants did not represent Finnish students in general, as they were international university students in Finland.

In general, students seem to perceive CLL positively also in the narrower context of mobile learning. In their recent review of mobile cooperative language learning studies published in 2012–2016, Kukulska-Hulme and Viberg (2018: 207) report on students' perceptions in terms of “increased motivation, engagement and enjoyment, mutual encouragement”, as well as reduced nervousness and embarrassment. These results can be complemented with the findings of Huang et al. (2017) who studied motivation and learning performance in a non-cooperative mobile game-based learning setting by using questionnaires and tests, as Taiwanese university students (N=100) practiced English vocabulary on an app called *Super Word King* for two weeks. The results indicated that this method improved the students' learning gains and it was accepted by them in terms of increased enjoyment of learning and self-confidence, as well as satisfaction with the learning results and with the ubiquitous nature of learning (Huang et al. 2017: 967-968). Furthermore, whether or not an activity functions as a game is not determined by the game designer's attempts and plans, but rather by the player students' perceptions of it – if the students find intrinsic pleasure in the game-play, the activity counts as a game (Hubbard 1991: 221, as quoted by Cornillie et al. 2012: 249-250).

Liu and Chu (2010) developed a ubiquitous learning environment HELLO that involved cooperative learning, game-based learning, and context-aware learning in order to research how mobile games influence students' motivation and learning outcomes in terms of English listening and speaking skills. The participants of this case study were Taiwanese 7<sup>th</sup> grade students of English (N=64) and three teachers, and the students were divided into control and

experimental groups, and further into teams of eight members (Liu and Chu 2010: 634). Quantitative and qualitative methods were used in terms of tests and interviews, respectively, and the whole research procedure lasted for eight weeks (Liu and Chu 2010: 631, 635). The authors conclude that the experimental group gained better learning outcomes, had higher motivation in terms of attention, relevance, confidence and satisfaction, and regarded the ubiquitous games as interesting and useful for learning, as well as particularly enjoyable for practicing listening and speaking (Liu and Chu 2010: 641).

In terms of motivation and learning outcomes, rather similar results were obtained by Berns et al. (2016), who studied learner motivation and the impact of the designed app for language learning via a four-week case study of German as a foreign language at a Spanish university. In order to do this, they developed a hybrid game-based app *VocabTrainerAI* that combined both individual and cooperative learning. The authors conducted focus group interviews and administered pre- and post-tests (N=104) as well as surveys (N=91) (Berns et al. 2016). According to Berns et al. (2016), the results indicate that the hybrid app which seamlessly combined individual learning in preparation to solve a murder mystery cooperatively in groups of three was perceived as a motivating and useful tool by the students to meet their learning needs, and it also improved the participants' language proficiency.

In another study, Liu, Holden and Zheng (2016) researched the game-play of three South Korean students learning English as a second language who played a location-based AR game *Guardians of the Mo'o* on ARIS in a university setting in Hawaii in order to promote cultural understanding, linguistic awareness and language learning. Post-game interviews revealed that the students perceived the in-game negotiations, visits to areas of the campus, and chances to interact with strangers in the physical world rather positively (Liu et al. 2016: 373.). Despite of the small number of participants and the fact that the game-play was not deliberately designed to be cooperative, the authors report that "the students were able to collaboratively negotiate to solve problems and coordinate their actions in our game" (Liu et al. 2016: 374). Perhaps mobile game-based language learning in general might be prone to promote cooperation, as the authors report on an extract where the students were unable to advance in the game without further negotiation within the group (Liu et al. 2016: 373). This speculation cannot be generalized too broadly, as mobile game-based language learning encompasses a broad spectrum of games from individualistic to highly cooperative ones.

However, I dare to claim that careful pedagogical design and the use of appropriate mobile games can provide favorable conditions for fulfilling the principles of cooperative learning.

Even though students seem to perceive mobile CLL rather positively in general, as it has been proven to increase motivation and learning outcomes, there are also exceptions. Kukulska-Hulme and Viberg (2018: 214) point out in their review that not all student perceptions were positive: negative perceptions included distractions and safety concerns regarding the use of mobile devices, experiences of uncertainty due to doubting the novel method's impact on learning, and technical problems that may cause loss of engagement and increased frustration among the students. In order to gain a more holistic understanding, it is vital to take into consideration not only the positive but also the negative perceptions of CLL through mobile devices held by students. The negative perceptions can serve as an important starting point when determining which issues to tackle in order to improve the students' learning experience. For example, technical problems cannot always be anticipated, but much can be done in advance in order to diminish frustration and boredom.

To my knowledge, there is no previous research on mobile game-based CLL that combines two target languages in parallel, which also means that students' perceptions of the matter have not been studied. Furthermore, it seems also that prior studies have not been conducted on studying multiple foreign languages in parallel on a joint lesson, as research has tended to focus on dual language education (see e.g. Lindholm-Leary 2001). There seems to be a lack of research also on students' perceptions of CLL in Finland, especially in the upper comprehensive school (grades 7–9). Nevertheless, research that takes into account the students' perceptions of mobile cooperative learning increased by nearly 67% during 2012–2016 in comparison to the preceding five years (Fu and Hwang 2018: 135). Consequently, the current study contributes to this growing pool of research and also adds to the slowly increasing amount of research on students' perceptions of mobile game-based cooperative language learning. Essentially, it provides a new perspective by combining two foreign languages simultaneously in a cooperative mobile game. In the following section, I will describe and explain how mobile game-based cooperative language learning that simultaneously combines multiple target languages is related to the National Core Curriculum for Basic Education (NCC 2016) in Finland.

### 4.3 Mobile game-based CLL in the National Core Curriculum for Basic Education (NCC 2016)

The National Core Curriculum for Basic Education is written by the Finnish National Agency for Education (EDUFI), and it provides nation-wide educational guidelines for comprehensive schools (grades 1–9) in Finland not only in terms of objectives and core contents of each subject, but also concerning the principles regarding assessment, good learning environment and working approaches, among other things (EDUFI n.d.). The National Core Curriculum for Basic Education, referred to as NCC 2016 in this study, is an outcome of the current curriculum reform – it was written in 2014 in Finnish and it has been applied in schools stepwise as of August 2016 (ibid.). Even though mobile game-based cooperative language learning (CLL) cannot directly be identified as a concept in the curriculum, mobile game-based learning and cooperative learning have been addressed on several occasions either directly or indirectly in the more general parts of the curriculum and in the parts specifically concerning language learning. Importantly, the local curriculum that has been created on the basis of the national curriculum was taken into consideration when designing the research setting, but it will not be referred to here in order not to disclose the identity of the school. In the following, I will discuss how the current study resonates with the national curriculum in terms of mobile game-based learning, cooperative learning, and the two target languages in grades 7–9, English (A syllabus) and Swedish (B1 syllabus).

To begin with, mobile game-based learning was identified in the national curriculum when references were made to the use of Information and Communications Technology (ICT). When referring to the use of ICT in the national curriculum, I understand that ICT is much broader a concept than mobile games, as it entails also many other forms of digital technologies and solutions. Thus, although the word *mobile* occurs only once in the whole national curriculum, it is embedded in the numerous ICT references. ICT competence (T5) is one of seven transversal competencies whose shared aim is “to support growth as a human being and to impart competences required for membership in a democratic society and a sustainable way of living” (NCC 2016: 33). In addition, ICT competence is both “an object and a tool of learning” (NCC 2016: 36), and in the present study it was actualized as the latter alternative. Furthermore, ICT competence entails familiarizing students with different ICT applications and their uses (ibid.), and in grades 7–9 T5 is specified as being a natural part of the students’ learning (NCC 2016: 479). Moreover, ICT can be used to create authentic

learning environments for language instruction based on the students' needs, both in the case of English and Swedish (NCC 2016: 551, 594).

Secondly, mobile game-based learning was also evident in references to the use of games and gameful learning. The national curriculum encourages teachers to make use of games and gameful learning when choosing appropriate working methods (NCC 2016: 49) as one way to facilitate "the joy of learning" (NCC 2016: 34). Both the B1 syllabus in Swedish and the A syllabus in English in grades 7–9 (the different syllabi will be explained below) emphasize that language instruction should make use of many different learning environments and devices, which can be interpreted as including mobile learning environments and mobile devices (NCC 2016: 568, 597).

Addressing cooperative learning in the national curriculum was located by using the five key elements of cooperative learning and its underlying conception of learning (see sections 3.2 and 3.3, respectively). The conception of learning in the national curriculum is a useful starting point, as it stipulates that students are active actors who learn "to set goals and to solve problems both independently and together with others" and reflect on what they have learned (NCC 2016: 26). This resonates with the conception of learners as active agents and the importance of individual accountability, cooperation, as well as group processing, i.e. reflection, in cooperative learning. It should be pointed out here that cooperative learning is treated as one possible realization of the umbrella term *learning together* in the national curriculum. Importantly, the process of working and learning together requires certain skills that students have to be willing to practice, learn, and improve (ibid.), which can be interpreted as corresponding to the element of interpersonal and small group skills in cooperative learning. Furthermore, the mission of basic education is to construct human capital, i.e. competence, as well as social capital, which consists of "contact, interaction and trust between people" (NCC 2016: 30), and I would argue that cooperative learning enables students to practice and grow both capitals simultaneously, as they gain more knowledge about the subject content while improving their social skills. Moreover, students are to be given opportunities to act in different roles, share tasks with each other, and take responsibility not only for personal goals, but also for shared ones (NCC 2016: 49). This resonates particularly well with the notion of role division as a means to practice interpersonal and small group skills and to establish positive interdependence within a cooperative group.

The underlying ideas of cooperative learning can also be identified in the description of learning environments and working as well as assessment methods in the national curriculum: versatile learning environments should promote interaction (NCC 2016: 48), diverse working methods should be used as they are prone to strengthen students' motivation, enjoyment and success (NCC 2016: 49), and versatile assessment methods give students opportunities to manifest their competence in multiple ways (NCC 2016: 50). Student assessment is mostly formative, i.e. it promotes learning (NCC 2016: 79). More specifically, it is stated in the B1 syllabus in Swedish and A syllabus in English in grades 7–9 that learning is to be assessed in diverse ways, including self and peer evaluation (NCC 2016: 568, 597), both “independently and in cooperation with others” (NCC 2016: 567, 596).

Students in Finland are obliged to choose at least one intermediate (B1) and one advanced (A) language syllabus: one of these has to be the second national language, i.e. Finnish or Swedish, and the other has to be a foreign language or Sámi (NCC 2016: 550). In the context of the current study, the following syllabi are relevant: A syllabus in English and B1 syllabus in Swedish. This reflects the commonplace language syllabi choice in Finland: 99.4% of students in grades 7–9 studied A syllabus in English and 85% studied B1 syllabus in Swedish in 2017 (Vipunen – Education Statistics Finland). The status of English as a global lingua franca is evident in the national curriculum in two ways: English has its own syllabus with somewhat higher requirements separately from the general foreign language syllabus (NCC 2016: 600-601, 608-609), and the students' ever-increasing use of English in their free time is acknowledged (NCC 2016: 594).

As this study combined two target languages, it resonates with a number of topics in the national core curriculum in addition to the obvious parts regulating language education and the relevant A syllabus in English and B1 syllabus in Swedish, namely, multilingualism, language-awareness, integrative instruction, and multidisciplinary learning modules. To begin with, language-awareness and multilingualism as manifestations of cultural diversity are important principles guiding the design of the school culture: each member of the school community is considered multilingual, the use of different languages in parallel is regarded as natural, and languages are appreciated (NCC 2016: 44). Importantly, language instruction should “strengthen the pupil's trust in their language learning abilities and in using their language proficiency confidently, even when it is limited” (NCC 2016: 550). Thus, even limited language proficiency is appreciated. The parallel use of English and Swedish in the

mobile game is hoped to contribute to making multilingualism tangible in the school's daily life in this research setting.

Integrative instruction and multidisciplinary learning modules are important elements of developing a desired school culture as well (NCC 2016: 52). They aim at providing a holistic learning experience that enables students to understand how different phenomena and themes relate to one another and how they are interdependent, which can be approached either within each subject or within the boundaries of interdisciplinary learning modules that combine several different subjects (*ibid.*). Moreover, the national curriculum states that “[c]ooperation between different subjects is a precondition for language education” (NCC 2016: 550). Cooperation between different subjects was approached rather modestly in the present study by combining two language subjects, but it was nevertheless present in the research setting.

To conclude, mobile cooperative language learning has attracted increasing research interest over the recent decade. Within this research domain, mobile game-based cooperative language learning highlights the portable nature of mobile devices and their affordances to foreign language learning, while simultaneously having the benefits of game-based learning and emphasizing the vital importance of cooperation within the group. The use of mobile devices entails some significant considerations, such as keeping the group size relatively small, sharing one device per group, and ensuring that every group member uses the device. In general, students have had rather positive perceptions of mobile CLL, for instance by showing increased motivation and engagement, and it has been shown to promote better learning outcomes. However, students' perceptions of this in the context of learning two target languages in parallel are unknown, especially in the mobile game context. Although the term mobile game-based CLL is not directly addressed in the Finnish national curriculum (NCC 2016), its two main constituents, i.e. mobile game-based learning and cooperative learning, can be identified more generally and also regarding language education in particular. Moreover, the simultaneous use of the two target languages, English and Swedish, relates to the notions of multilingualism and multidisciplinary learning modules. In the next section, I will present the outline of the current study in detail.

## 5 THE PRESENT STUDY

This qualitative study aims to find out how nine 8<sup>th</sup> grade students perceive the mobile game-based cooperative language learning setting that combines two target languages, as realized through the game-play of *School Detectives*. Prior to data gathering, I designed the *School Detectives* mobile game on ARIS, and this outcome will be outlined below in section 5.2.2. The data consists of video recordings and observations of the game-play, iPad screencast videos, questionnaires, and group interviews, and it will be analyzed by using the method of qualitative content analysis.

### 5.1 Research aim and questions

The aim of the present study is twofold: on the one hand, it combines the current hot topics of mobile games and digitalization in language education with cooperative learning, and on the other hand, it aims to shed light on how upper comprehensive school students orient to this combination that involves two target languages in parallel. Furthermore, my personal goal is to set an example that any language teacher without programming skills can design mobile games as teaching materials.

Previous research on cooperative language learning in the mobile game context has primarily used a specific cooperative structure, such as the jigsaw method (see e.g. Holden and Sykes 2011), instead of applying the five main principles of cooperative learning more freely. The present study has adopted the latter perspective, and it thus aims to provide new insights into how the five cooperative elements can be built into a mobile game-based CLL setting. Furthermore, more research on mobile cooperative learning is needed in lower educational levels, as most research on the topic has been conducted in the context of higher education (Fu and Hwang 2018: 129). The present study contributes to this need by using a participant population of 8<sup>th</sup> grade students (at the age of 13–14) at a Finnish upper comprehensive school. The focus of this study is not on determining how much or what the students learn during the cooperative game-play, as the perspective of improved learning outcomes has already been explored quite extensively in previous studies (see e.g. Liu and Chu 2010, Berns et al. 2016). Instead, the focus is on the students' perceptions of mobile game-based CLL, because this domain deserves further investigation. As Kétyi's (2015: 310) study illustrated, despite improved learning outcomes, students may consider the mobile learning resource to

contribute very little to the development of their language skills, and thus it is highly important to take into account the students' perspective.

In essence, prior research on how students perceive mobile CLL has indicated that students have an overall positive orientation to it, as it makes learning more interesting and enjoyable, while also increasing motivation and engagement but reducing nervousness and embarrassment (Kukulska-Hulme and Viberg 2018). More specifically, the mobile game used in this study was designed to include AR and to be location-based, as these features are known to increase students' engagement and motivation (see e.g. Taskiran 2018 and Melero et al. 2015, respectively). Previous studies have shown that students consider mobile learning a useful supplement to class instruction (Gafni 2017: 312), and this view was adopted also in the present study, as the idea of the cooperative game-play was to rehearse contents previously covered in class. However, little is known about how students perceive the combination of two target languages in a mobile game-based CLL setting. A previous study by Sun and Yuan (2018) illustrated no difference in the students' orientation to (non-mobile) CLL irrespective of the target language. Nevertheless, this research neither focused on a mobile game setting nor combined several target languages. Consequently, it remains to be explored how students perceive a combination of target languages in the mobile game-based CLL setting. The current study aims to address these gaps by answering the following research question and its subquestions a-e:

1. How do the students perceive this mobile game-based cooperative language learning setting that combines two target languages?
  - a) How do the students perceive the game-play in general?
  - b) How do the students perceive the cooperative group work as part of the game-play?
  - c) How do the students perceive English respective Swedish as target languages in the game?
  - d) How do the students perceive the use of two target languages in parallel in the game-play?
  - e) How do the students perceive the idea of mobile game-based CLL as part of foreign language lessons in general?

## 5.2 Data collection

The data was gathered in November 2018 during one whole school day in Eastern Finland in a medium-size comprehensive school with approximately 400 students. The participants (N=9) were 8th grade students (age 13–14), both boys and girls, and they played the *School Detectives* game one group at a time in groups of three. Prior to the data gathering, the students prepared for the game-play by doing a cooperative exercise and playing a demo game. The data consists of several components: video recordings and observation of the game-play, iPad screencast videos, individual questionnaire answers, and group interview material. After the game-play, each student filled in a questionnaire, which was followed by a group interview. Both were done in the participants' mother tongue Finnish, as this was best suited for the objectives of the questionnaire and the group interview – the aim was to gain insights into the participants' perceptions, and thus doing this in a foreign language would probably have been more of a hindrance than a facilitator. As the research question focuses on the students' perceptions, the analysis is primarily conducted based on the interview and questionnaire results, which are supplemented and supported by observation notes and video recordings. The data is stored in the archive of the Society of Swedish Literature in Finland (SLS) as *SLS 2330 Mobilspel i språkundervisningen. Finskspråkiga högstadiel elever tränar svenska och engelska kooperativt* [Mobile games in language teaching. Finnish-speaking upper comprehensive school students practice Swedish and English cooperatively].

The whole data gathering procedure was piloted with a group of three students from a parallel class a week in advance in order to test and improve the *School Detectives* game as well as the questionnaire questions and interview content. As a result, some technical bugs and a quest were removed from the game, and the difficulty level of Swedish was lowered in order to shorten the playing time and to adjust the appropriate difficulty level. In addition, the formulation of the answer alternatives in the closed-end questionnaire questions was changed in order to add uniformity and to reduce unnecessary complexity. Furthermore, the interview topics were adjusted to better provide answers to the research questions by removing irrelevant topics and replacing them with more suitable ones.

Furthermore, after all these adjustments based on the pilot experience, two different versions of the game were created in order to take into account one student's special needs. One of the participating students in Group 1 (Marko) is a mutist, which affected the nature of the roles used in that group in the sense that one of the roles was time keeper instead of reader. In

addition, some other minor adjustments were done to the quest instructions in the game in order to allow this student to fully participate in the game-play. Naturally, this also affected the formulation of the questions regarding the roles in the questionnaire and the interview, and in this sense the data is not identical between Group 1 and Groups 2 and 3.

### **5.2.1 Participants**

The participants were altogether nine 8th grade students, three boys and six girls aged 13–14 who all attended the same class. Approximately a month before the data gathering, I sent an information letter to the prospective participants and visited the school in order to inform the students and their custodians about the project. After this, they had a few weeks to decide whether or not to participate in the study and to return the signed research permissions. In the end, everyone who volunteered to participate and was present on the data gathering day was included in the study.

The students played the game in predetermined groups of three. The English and Swedish teachers were consulted when making the group divisions, and the principle was to create heterogenous groups by accommodating a variety of skill levels from more to less advanced students and by having both girls and boys in each group. The aim was also to take group dynamics into consideration, and the teachers advised me not to put certain students into the same group, as they reckoned that they would struggle with working together. However, on the data gathering day, two original participants were absent, and thus two students from the reserve places participated in the study, which created an imbalance in the distribution of boys and girls in the groups. As a result, Group 1 consisted of two boys and one girl, Group 2 of three girls, and Group 3 of one boy and two girls. The participants in each group are listed by using pseudonyms in section 6.1.

### **5.2.2 ARIS game *School Detectives***

In order to gather the data, I first created a language learning mobile game on ARIS (see section 2.4 for a description of the ARIS platform and app). I built the game around a mystery narrative that was situated in the local school in Eastern Finland, hence the name *School Detectives*. The basic idea of the game was that the students had to understand and produce both English and Swedish in order to progress in the game. The game had two protagonists:

an American exchange student Emily who did not come to school that day, and a famous Swedish detective Håkan whom the players helped to find Emily in the game.

As outlined in section 4.3, the national curriculum highlights that language education is facilitated by cooperation between different subjects, which can be done through integrative instruction and multidisciplinary learning modules (NCC 2016: 52, 550). The original idea was to approach a grammar topic from the perspective of English and Swedish during the game-play, but this turned out not to be a fruitful approach, as the students' skills in the two languages were at such different levels (due to the advanced A syllabus in English and the intermediate B1-syllabus in Swedish). Instead, the broader phenomenon that was integrated into the game-play was communicative language use – the students had to understand the instructions and game-content in order to progress in the game, i.e. they did not have to understand every single detail, but enough to know where to go, what to do and what kind of language to produce in the different quests.

### 5.2.2.1 Description of the game

The game logic was built around quests, i.e. tasks that had to be completed in the game. There were altogether six quests, the first three of which had to be completed in Swedish, and the remaining three in English. However, the use of and exposure to English and Swedish was quite evenly distributed throughout the game. Even though the first three quests were in Swedish, the students needed English also during the first half of the game, and vice versa. Usually each quest had to be completed before the next one would be activated, but *Quest 2: Hjälp Håkan att hitta Emily [Help Håkan to find Emily]* was ongoing for a longer time. Upon quest completion, an item resembling a coin with a thumb up icon popped up on the screen as a reward, and the players could pick it up. The six quests in the game were the following:

- Quest 1: Vem är ni? Berätta för Håkan [Who are you? Tell Håkan]
- Quest 2: Hjälp Håkan att hitta Emily! [Help Håkan to find Emily!]
- Quest 3: Vad gjorde Emily igår? [What did Emily do yesterday?]
- Quest 4: Interview
- Quest 5: Open the padlock
- Quest 6: Emily calls her parents

The instructions of Quest 6 were slightly different in Group 1's version of the game in order to take into account the mutist participant. Instead of choosing between the roles of Emily, mom and dad for the phone call, this group was instructed to choose between the roles of Emily, mom or dad, and recorder, to make sure that all could participate in the task.

Other significant game elements besides quests were conversations with fictional characters, different items to be picked up from the map, and plaques that contain information boxes with either written text, pictures, audio files, or a combination of the above (see Figure 1). Yet another important aspect of the game was the Notebook tab that was used by the players to create their own content in the form of videos, texts or audio recordings either in Swedish or English. Instructions on each quest specified what the players needed to do, and often they were asked to use a certain hashtag (#) in their outcomes. Successful quest completion unlocked the next step in the game. I have strictly followed the copyright laws when choosing images to be used in the game – they have either been taken by my acquaintances for the purpose of being used in the game or taken from websites offering royalty free clipart.

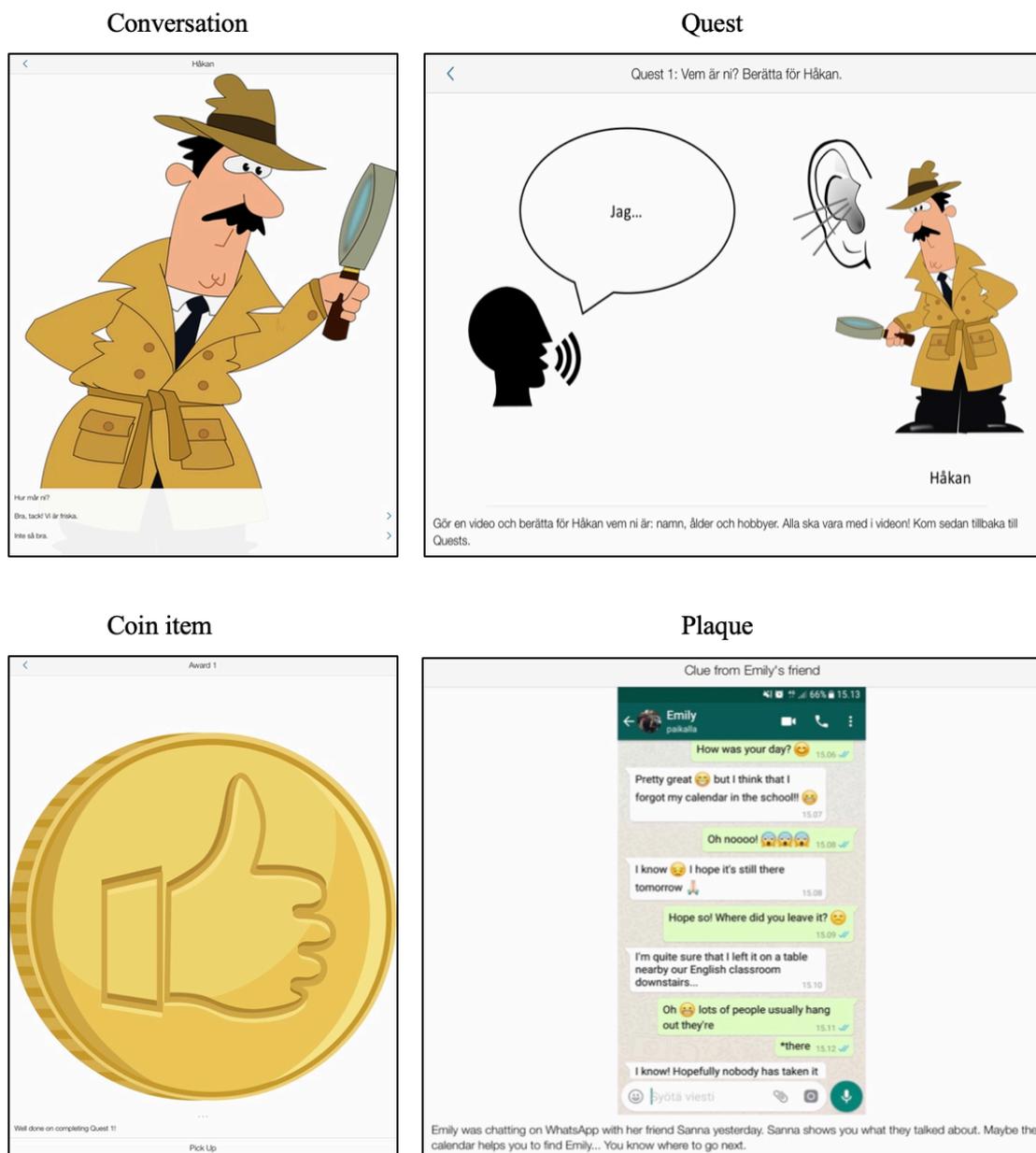


Figure 1. Significant game elements: conversations, quests, items and plaques

The game was location-based in the sense that the students needed to move to different locations in the school building to further progress in the game. To exemplify this, the students were given clues on where to go next in the game, for example to walk to the teachers' room. Upon arrival, they found a QR code on the wall outside of the room, and scanning it revealed a new clue, such as a voice recording, in the game. Another example is that a clue of where to find Emily's calendar that includes crucial information was embedded in a WhatsApp message (see the plaque in Figure 1 above), and thus the students knew to look for the calendar on a table downstairs nearby their English classroom. In addition to being location-based, the game made use of augmented reality (AR) in order to offer an authentic and engaging virtual context for language learning (see for instance Taskiran 2018: 896, Cervi-Wilson and Brick 2018: 50, and Perry 2015: 2309). AR was used to reveal the correct number combination needed to unlock a padlock attached to the calendar in Quest 5. In other words, the idea was that when playing the game, the students would notice a need to communicate in English and Swedish in their virtually enhanced everyday context within the school building, partly outside of the classroom.

I chose the language content to be practiced in the game by following a local syllabus and by consulting the English and Swedish teachers. The aim of the game was to provide an opportunity for the students to practice content that had already been dealt with in the classroom during the fall semester of 2018, instead of introducing completely new topics. This included for instance past simple tense, illness vocabulary and presenting oneself in Swedish, and household chore vocabulary, interviewing, as well as different tenses in English. The game provided the students with multimodal input: they were exposed to written texts, spoken language in the form of audio recordings, and pictures. The purpose of using pictures was twofold: they were used as a prompt and as a means of scaffolding. Examples of the first usage include asking the students to write two things that Emily did yesterday and two things that she did not do yesterday based on picture prompts, and asking the players to record an audio where they tell about Emily's day based on a drawn picture at the end of the game. A couple of examples of scaffolding are illustrating quest instructions with pictures (see Figure 1) and having a notepad as a symbol on the map for a plaque called *Håkans anteckningar* [Håkan's notes], as I anticipated that the Swedish word for notes, *anteckningar*, would be difficult and new for the students. I aimed to set a suitable difficulty level in the game, but due to individual differences, some students probably found the game easier or more difficult than others.

There were three roles for the students during the game-play, and each student tried the roles of encourager, iPad user, and either reader or time keeper. The roles of encourager, reader and time keeper are listed by Sahlberg and Leppilampi (1994: 118-119) as suitable roles to be used in the Finnish school culture, and even the last role of iPad user can be traced back to their list of suggestions as a modernized version of material supplier in the sense that the iPad was the primary material to be used in the game-play situation. Encourager was the only social role in my setting, and its aim was to encourage other group members, especially shy participants, to participate in the game-play. The remaining two roles of iPad user and either reader or time keeper were concerned with accomplishing the task, i.e. progressing in the game. The reader's task was to read out loud for the group what he or she saw on the screen, including quest instructions and other written content, whereas the time keeper's task was to keep track of the remaining gaming time. Reader was my primary choice for the third role because I considered it more beneficial for the group's progression in the game, and as the responsibility of keeping track of time could easily be given to the group as a whole. Because one of the participants in Group 1 could not participate by speaking, the role of time keeper was used instead of reader in this group. The iPad user was responsible for doing everything on the device, including holding the device, touching the screen, and doing game-related tasks such as writing and recording an audio or video. Next, I will explain how the five key elements of cooperative learning were implemented into the game-play of *School Detectives*.

#### **5.2.2.2 Implementation of the five key elements of cooperative learning into the game-play**

The game-play was conducted in the context of formal cooperative learning, and it was designed to adhere to the five key elements of cooperative learning, i.e. positive interdependence, individual accountability, promotive interaction, interpersonal and small group skills, and group processing (Johnson et al. 1994). As outlined in section 3.2, the five main elements can be established in a myriad of ways, and it should be noted that the present study has employed only some of these ways in its cooperative design, because not all of them were feasible to use within the scope of this research setting. In the following, I will elaborate on how each of these elements was considered in the game-play design.

Positive interdependence was designed into the game-play setting in terms of resource, role, identity, and fantasy interdependence. To begin with, each group shared an iPad instead of every group member having their own devices. As Thorne et al. (2015: 281) put it, sharing a

device within a group instead of individuals using their own devices obliges the players to cooperate within their group, as each member shares an orientation to the device and also to the person holding it. In addition, the size of the group was limited to three, as small group size is prone to facilitate students' concentration (Melero et al. 2015). Positive interdependence was also maintained by assigning different roles to the players. Sahlberg and Leppilampi (1994: 118) point out that the number of roles used in a cooperative activity should be quite limited in order not to confuse the students, that the students should get experience practicing all the roles, and that one should choose roles that best suit the cooperative activity at hand. As the game was played in groups of three, three different roles were circulated throughout the game so that each student was in each role once during the game-play. The role division contributed also to ensuring that only one student at a time was eligible to hold the iPad, which was a shared resource in the group. What is more, each group was instructed to come up with a group name, which is known to reinforce identity interdependence (Johnson et al. 1994: 28, Jolliffe 2007: 41). Lastly, the fictional game narrative required the students to take on imaginary roles of deputy detectives, which created positive fantasy interdependence (ibid.). A shortcoming of the game-play setting was that the goal interdependence within the group could have been clearer, for instance by asking the students to make sure everyone learns the material (see e.g. Jolliffe 2007: 4).

The design of individual accountability into the game-play in terms of holding each member responsible for the group's overall success was the weakest element in this research setting. To a great extent, it rested on the notion of role division, as the different roles were hoped to promote individual accountability in the sense that cooperation would be impaired if the players did not adhere to their roles, and as no-one could hitchhike on other's work because everyone was responsible for each role in turn. In addition, small group size was also hoped to contribute to individual accountability, as research has shown a correlation between these two (see e.g. Johnson et al. 1994, Johnson and Johnson 2009, and Tran 2013). Furthermore, I assumed that encouraging the students to orient to playing the game as an opportunity to give evidence of their language proficiency in English and Swedish for evaluation purposes would contribute to the students' sense of individual accountability during the game-play, as testing for evaluation purposes is a common way of constructing individual accountability (Jolliffe 2007, Johnson et al. 1994). However, this idea remained a little vague in the current research setting, because the evaluation part was excluded from the research design and left for the teachers' responsibility, as its implementation would not have been feasible within the scope

of this study. It was agreed that the language teachers would use the student-created game productions (videos, text and audio) as material for formative assessment later on. Had the scope of the current research been more flexible, a better option would have been to test each group member's command of the game-created content directly after the game-play in order to make them more committed to putting effort into their learning during the game-play.

Promotive interaction was hoped to be a rather natural outcome of the game-play setting, as the game was played in cooperative groups of three students. This learning setting was also hoped to offer enough scaffolding in the game-play for those who otherwise would struggle to play the game on their own. In other words, the idea was that the group members would facilitate each other's success in the face-to-face interaction by helping one another to carry out the tasks assigned to the specific roles, exchanging information regarding how to proceed in the game, giving feedback on each other's ideas, and striving for a common benefit for the group in terms of completing the game on time (Johnson et al. 1994, Johnson and Johnson 2009, and Gillies 2007).

It was hoped that having a 20-minute cooperative exercise focusing on possible problems in conversation (see section 5.2.3 and Appendix I) prior to the game-play would contribute to the use of interpersonal and small group skills when playing the *School Detectives* game. I am aware of the limited nature of the exercise in the sense that managing conflict situations in a constructive manner is only a fraction of interpersonal and small group skills (see e.g. Johnson et al. 1994, Johnson and Johnson 2009, and Jolliffe 2007), and that one 20-minute exercise cannot miraculously turn the students into skilled cooperators, but I however believe that it had high potential to tune the students' thinking into a more cooperative mindset. In addition, the use of specific roles in the game necessitated practicing certain interpersonal and small group skills at a very basic level: the roles of iPad user and encourager promote forming skills such as using materials and resources and encouraging all members to participate, respectively (Johnson et al. 1994). Even though reading the instructions out loud is not addressed by Johnson et al. (1994), I would argue that it also belongs to the basic set of skills needed for group work. However, the role of time keeper that was used in Group 1 is categorized at a higher level as it represents functioning skills (ibid.). Furthermore, the whole concept of role division required the students to stay in a group, which is one of the very basic skills on the forming skills level (ibid.).

Group processing was designed into the research setting by administering questionnaires and conducting group interviews directly after the game-play (see sections 5.2.4 and 5.2.5, respectively). The questionnaire and the interview provided the students with opportunities to reflect on their game-play experience for example in terms of how well their group or they themselves functioned and what could be improved. The major shortcoming of the group processing design in this study was that the individual students did not receive systematic individual feedback from other group members or an instructor, as they conducted self-evaluation and evaluated the performance of the whole group on different aspects of the game-play. The lack of peer and instructor feedback targeted at each individual is a pity, because research has shown that feedback directed at an individual is more effective than directing it at the whole group (Archer-Kath et al. 1994). Systematic peer feedback for each group member was omitted due to time limitations and because I did not want to risk making the group processing procedure a face-threatening experience for the participants, as I was not familiar enough with the group dynamics. However, feedback was occasionally targeted at individual students during the interviews either by peers or the interviewer.

### **5.2.3 The game-play**

Six important preparations were made prior to the start of the game-play. The first two preparations were done during a 40-minute preparation session with all the groups present simultaneously. Firstly, the students did a 20-minute cooperative exercise focusing on possible problems in conversation in order to implicitly tune the students into a cooperative mindset (see Appendix I). The cooperative exercise was adapted based on Task 92 in Toivakka and Maasola (2012: 184), and it focused on prospective problems in conversation by using a cooperative jigsaw method, in which students familiarize themselves with a topic in expert groups and go then back to their heterogenous base groups to explain what they have learned (Clarke 2002: 85). I started the exercise by going through its objectives, which was followed by a warm-up activity where the students shared their experiences on what has previously been problematic to them in group work interaction. This was first done in small groups, after which volunteers shared their answers with the rest of the class. In the first main stage, the students were divided into expert groups, each of which was asked to discuss a specific issue related to the topic, i.e. either dominant participants, shy participants, or conflicts and discord. Prior to the discussion, every group was provided with a handout and they were instructed to first think about the topic on their own for a few minutes before discussing it in their groups. The idea was to think of concrete strategies for preventing or

dealing with these possible problems in cooperation. In the second stage, the experts from each group formed heterogeneous groups with experts on other topics, and these were actually the groups in which the students would play the *School Detectives* game later on. The expert students shared their ideas on the topics, and they were encouraged to comment on the ideas presented by others. In the final stage, each group was asked to share some of their concrete strategies with the rest of the class.

Secondly, the students practiced the game mechanics by playing a demo game for about another 20 minutes. The demo game was used in order to offer a low-threshold entry to getting familiar with the game's user interface and the internal game logic. The demo had a simple narrative (a British tourist had lost her backpack and the students helped her to find it), and the main point was to introduce the students to the various tabs and how to use them in the game. The students played the demo game in the same groups that were later used in the actual game-play situation, and they all shared one iPad per group, as would be the case in the real gaming situation as well. Everyone practiced using the iPad in order to reduce possible anxiety that the use of a new device might cause. The participants played the demo game and completed it at their own pace, as I was observing and making sure that all groups understood the internal game logic. At the end of the preparation phase, the groups were asked to decide on a group name and to take a picture for their group in the player account. This was done as an attempt to strengthen group dynamics and cohesion.

The last four preparations were done separately with each group before their game-play. Firstly, the students were informed that they had a time limit of 45 minutes to finish the game, and they were encouraged to use one player's cell phone to keep track of time and to take pictures of the quest instructions, if necessary. The use of online dictionaries was not allowed in order to avoid a constant use of Google Translate or similar resources and to encourage the students to rely on their group members. However, the groups were allowed to ask me for advice in case they encountered technical difficulties related to the game. Secondly, the initial roles were given to the players. The game informed the players when and how to change the roles approximately after the first and second thirds of the game. Thirdly, two GoPro cameras were placed on two volunteer players, one on each person's head, in order to record the group-internal interaction. Lastly, I started a screencast recording on the group's iPad in order to collect data on what happens on the screen. However, these screencast videos were not part

of the main data, as they were merely used to check interpretations of the data and to better see what was happening in the game in a given moment of the game-play.

I observed each group's game-play from the start to the end. This was overt observation since the participants were fully aware of being observed (Roller and Lavrakas 2015: 173). My role was a participant-observer (Roller and Lavrakas 2015: 174), as I intervened with the game-play only if the group seemed to be skipping an important and necessary stage in the game, if they seemed to completely misunderstand the quest instructions, if the group faced some technological difficulties, or if something unexpected such as a fire drill happened. I did not interfere immediately, but let the group figure out what to do on its own first. When I occasionally did interfere, I tried to lead the group to the correct path in a rather subtle manner, such as by suggesting them to read the instructions once more and to pay attention to specific details. I adopted this observer role instead of a mere passive participant who does not interfere with the game-play at all, because I considered this role to better serve the purpose of this research, which was not to see how well the students could do on their own, but rather to support them in the game-play, which is in line with the teacher's role as a mentor in cooperative learning (Hellström et al. 2015: 6).

I followed each group within some distance in order not to intimidate them but to be able to hear and see them and filled in an observation grid (see Appendix II). Roller and Lavrakas (2015: 206) highlight the usefulness and importance of an observation grid by describing it as "a spreadsheet or log of sorts that enables the observer to actually record and reflect on observable events in relationship to the research constructs of interest". As suggested by Roller and Lavrakas (2015: 207), I created my observation grid by placing the relevant research issues as the column headings and the more specific foci of observation as the row headings. Using an observation grid is important for a number of reasons: it not only enables the observer to focus on all key research issues, but it also enhances the quality and credibility of the data, as well as eases the analysis of the data later on, as the observations have already been made thematically (*ibid.*). During the analysis procedure, I used the observation notes as a starting point to gain an overall understanding of each group's game-play prior to going through the questionnaires, interviews or video recordings.

As mentioned above, the students had a time limit of 45 minutes to finish playing the game. However, due to differences between the groups and to some external factors, each group

needed a different amount of time to complete the game. Group 1 finished the game in 48 minutes, with a pause in the middle caused by the fire drill. It is understandable that the fire drill caused some delay in the game-play, as it takes a while to orient back to the game-play situation. Group 2 finished the game in 35 minutes uninterrupted, whereas Group 3 needed 55 minutes. Group 3 was about to start the last quest of the game when their time was up, but I allowed them to continue, as they were the last group of the day and the data recording schedule showed flexibility. I set the time limit of 45 minutes primarily in order to make sure that I have time to go through the whole data gathering process with all the groups. The fact that the previous groups had completed the last quest rather quickly also contributed to my decision to let the last group finish the game overtime.

#### **5.2.4 Questionnaire**

After the game-play, each student filled in a questionnaire (see Appendix III) related to their experiences of playing the *School Detectives* game, prior to being interviewed in groups. While questionnaires are a suitable research method in a variety of different situations with a range of versatile participants and topics, and they are an efficient way to gather data (Dörnyei and Taguchi 2009: 6), it is common to complement questionnaire data with interviews in order to overcome the shortcomings of questionnaires in terms of little potential for in-depth analysis caused by the limited time and effort that the participants use to provide their answers (Dörnyei and Taguchi 2009: 109). The main reason for administering the questionnaire at this stage of the data gathering process was to allow the students a moment to reflect on the game-play experience on their own before proceeding to the group interview. Conducting the individual questionnaire prior to the group interview was hoped to encourage the participants to give their honest opinions irrespective of what their peers think. Furthermore, the questionnaire was used in addition to the group interview because questionnaires can decrease interviewer effect bias, which leads to more consistent and reliable results (Dörnyei and Taguchi 2009: 6).

The questionnaire was in the participants' mother tongue Finnish and the questions were organized around the following broad themes: the game-play of *School Detectives* (questions 1–3), group-internal cooperation (questions 4 and 5), role division (question 6), own effort (question 7), comparison between English and Swedish (questions 8-10), and foreign language lessons in general (question 11). The number of questions was limited to 11 in order to avoid the fatigue effect, which means that the participants may not answer some questions

accurately because of tiredness or boredom caused by too long or monotonous questionnaires (Dörnyei and Taguchi 2009: 24).

The questionnaire included both open-end questions and closed questions. In order to make the questionnaire serve its purpose as straightforward and quick to fill in, the questions were primarily closed (questions 1 and 4-11), as answering them is easier in comparison to open-end questions. This is because closed questions require less physical effort, asking the participants for instance to circle or underline their answers instead of writing them, as well as less mental effort in that the participants merely need to react to possible answers instead of having to mentally construct them (Peterson 2000: 38). Participants who do not put enough effort in their answers are a possible down-side of using closed questions (*ibid.*), but this risk was minimized by the preparatory nature of the questionnaire prior to conducting the interview where the participants had ample opportunities to reflect on and justify their questionnaire answers. As Dörnyei and Taguchi (2009: 36) note, short open-end questions should be used when the range of response options is unknown and pre-prepared categories cannot be constructed, and thus questions 2 and 3 were open-end.

Several different types of closed questions were used in the questionnaire. The simplest type was dichotomous questions, i.e. questions with only two answer alternatives, either *yes* or *no* (Peterson 2000: 37). Question 11 belongs to this category, and question 8 can be seen as a modification of a smiley face scale (Peterson 2000: 71) into a dichotomous form, as it instructed the participants to choose between agreement (happy smiley face) and disagreement (sad smiley face). I did not want to include a neutral answer alternative in the middle, because I anticipated that the young participants might be prone to choose the middle position too easily. Questions 5, 7 and 9 were rating scale questions with balanced rating scale categories, which means that there was an equal number of categories for the participants to answer either positively or negatively (Peterson 2000: 69). In this case, the participants had to choose between the options *very satisfied*, *satisfied*, *dissatisfied* and *very dissatisfied*.

I applied the principle of balanced categories, which is to be preferred instead of unbalanced categories (*ibid.*), also in the remaining questions where the participants were instructed to choose as many suitable answer alternatives as they wanted to, which are called checklist questions (Dörnyei and Taguchi 2009: 36). This applies to questions 1, 4, 6 and 10, and the categories were balanced in the sense that in the left column the alternatives were positive, in

the right column they were negative, and in the middle column they were kind of miscellaneous, not necessarily positive or negative. In addition, an alternative for *other (specify what)* was offered separately below the alternatives. According to Peterson (2000: 42), an "other" alternative is used to ensure that all participants can provide an answer, and this was also my intention. The answer alternatives were similar in all these questions, with the exception of some minor spelling differences required by the different grammatical cases in Finnish, in order to make the answering procedure as straightforward as possible.

### 5.2.5 Interview

Directly after the students had filled in the questionnaire, each group was interviewed in Finnish (see Appendix IV). These interviews were an integral part of the data, because questionnaires are not well suited for gaining in-depth knowledge on a topic, as they are rather simple and straightforward (Dörnyei and Taguchi 2009: 7). The interview covered the same themes that were used in the questionnaire (see section 6.1.4) but did this in a more in-depth manner. Follow-up interviews are beneficial in the sense that they let the interviewer "ask the respondents to explain or illustrate the obtained patterns and characteristics, thereby adding flesh to the bones" (Dörnyei and Taguchi 2009: 109). I went through the participants' questionnaire answers and asked them to comment retrospectively on why they had answered in a particular way or to elaborate on their answers, and thus the previous answers on the questionnaire were used as prompts for further open-end reflection and discussion in the interview (Dörnyei and Taguchi 2009: 109-110). Group interviews entail the risk of psychological peer pressure, as some participants might feel pressured to follow the general consensus of the group instead of expressing their genuine opinions (Crawford 1997). However, this was not considered a major risk in the present research setting, because the students had already answered the questionnaire individually, being unaware of their group members' answers.

The nature of the interview was a semi-structured focus group interview. I chose to follow a semi-structured interview protocol because it best suited the needs of this study by allowing me to focus on the research issue, while simultaneously making the participants' contributions highly relevant. This is reflected in the definition of semi-structured interview by Galletta (2013: 1-2) as "sufficiently structured to address specific dimensions of your research question while also leaving space for study participants to offer new meanings to the topic of study". Furthermore, semi-structured interviews can be seen as situated between the two ends

of the continuum, the structured approach and the less rigid approach for focus group interviews, presented by Liamputtong (2011: 2). The main aim of using focus groups is to understand a specific research topic from the participants' perspective through their interpretations and thoughts (Liamputtong 2009, as quoted by Liamputtong 2011: 3). As my research focus was solely on the participants' perceptions, I have conceptualized the interview method as a semi-structured focus group interview.

I followed Liamputtong's (2011) practical considerations when planning the interview stages. The preparatory stage included visiting the site in advance, checking the equipment, i.e. the voice recorder, and arranging the table and chairs in a circle so that every participant could face each other, as this arrangement promotes inter-group interaction during the interview, instead of urging the participants to talk directly to the interviewer (Liamputtong 2011: 72). In the introductory stage, I emphasized that everyone's answers are equally valued, that there are no right or wrong answers, and that the participants' answers do not have to converge but they can also disagree on the matters at hand (Liamputtong 2011: 73). Importantly, I explained that the aim of the interview was to encourage the participants to speak to each other instead of merely addressing the moderator (ibid.). In the questioning stage, I progressed through the interview by using the question guide (see below) to elicit discussion and by using prompts to make the participants interact more, while managing the time and inviting all participants to participate (Liamputtong 2011: 74-75). In addition, I referred to the participants' questionnaire answers, as some of the interview questions were directly linked to the questionnaire questions. In the last stage of ending the interview, I asked if the participants wanted to add something to the discussion and thanked them for participating in the data gathering (Liamputtong 2011: 75).

I followed a question guide when conducting the interview (see Appendix IV). According to Liamputtong (2011: 75), a question guide is essential because it helps the researcher to cover the key issues, and it thus determines the success of the focus group session. I organized my question guide clearly into different themes and numbered the questions within each theme in order to make the guide easier to follow. The internal structure of the question guide was in accordance with the model proposed by Liamputtong (2011: 76): I started with introductory questions about the students' previous gaming background, then moved on to transition questions focusing on the participants' opinions about the *School Detectives* game, after which I started asking the focus questions based on my research questions. The focus

questions were built around the themes of general game-play, group-internal cooperation in the game-play, role division, own effort, comparison of English and Swedish, and foreign language lessons in general. However, it should be noted that the transition questions regarding the *School Detectives* game also contributed to investigating the general game-play experience.

It is difficult to say exactly how many questions I had in the interview guide, as some of them included sub-questions or alternative formulations that could be used if needed, but the guide included altogether approximately 24 main questions. However, the final number of questions that were actually asked in the interview setting is probably substantially higher, because I elicited more information from the participants via prompt questions. In other words, instead of strictly adhering to the interview guide, I allowed a natural conversation to emerge between the students and used prompt questions to elicit more information (Liamputtong 2011: 77). Some strategies for asking the prompt questions are probing the participants to say more about a topic, following up participants' comments by requesting for an elaboration, and offering an interpretation of the participant's answer to be either accepted or corrected by them (Liamputtong 2011: 77-79).

### **5.3 Qualitative content analysis**

The data was analyzed by using the method of qualitative content analysis. To begin with, it is "a method for describing the meaning of qualitative material in a systematic way [...] by classifying material as instances of the categories of a coding frame" (Schreier 2012: 1). Qualitative content analysis was deemed to be an appropriate analysis method in this study because it is recommended to be used when analyzing rich data that needs interpretation, which may include both verbal and visual data (Schreier 2012: 3). Content analysis was originally a solely quantitative method, but it is nowadays also used in qualitative research (Titscher, Meyer, Wodak and Vetter 2000: 55). The starting point of this study is problem-driven content analysis, as the data was approached with specific research questions in mind, in contrast to forming the research questions afterwards based on the data, which would be a matter of text-driven content analysis (Krippendorff 2018: 384).

The key to conducting content analysis is allocating data to different categories (Titscher et al. 2000: 58), i.e. using a coding frame. Categories within qualitative content analysis can be formulated inductively based on the data, which is called data-driven analysis (Schreier 2012:

84, see also Tuomi and Sarajärvi 2018: 108) or conventional content analysis (Hsieh and Shannon 2005: 1277), as opposed to using previous knowledge about theories, prior research or even everyday knowledge and logic, known as concept-driven analysis (Schreier 2012: 84, see also Tuomi and Sarajärvi 2018: 109-110) or directed approach (Hsieh and Shannon 2005: 1277). Moreover, data- and concept-driven approaches are usually combined in qualitative content analysis (Schreier 2012: 94), and as Schreier (2012: 7) emphasizes, qualitative content analysis should always be data-driven, at least partly, in order to adequately adapt the coding frame to the material.

The coding frame used in the present study (see Appendix V) was compiled by combining the two approaches, while the main emphasis remained on the data-driven method. The main categories and some of their subcategories were initially deductively formed based on the research question as well as the key themes in the interview and questionnaire, and they were later supplemented with additional main categories and subcategories inductively derived from the data. Keeping the a-priori defined research questions in mind when forming the main analysis categories was hoped to decrease the risk of not succeeding to identify key categories (Hsieh and Shannon 2005: 1280). As Schreier (2012: 87) has put it, using a topic guide from the data collection procedure as a deductive framework for building the main categories of the coding frame is a concept-driven strategy, and in this respect the coding frame of this study was partly built by using a concept-driven approach. However, the data-driven approach was inevitable, because it was not possible to anticipate all the relevant categories in advance (Schreier 2012: 87), and because no coding frames that would be applicable in this rather unique research setting were readily available from previous research. Thus, it was not feasible to rely on a solely or even mainly concept-driven approach.

Building the coding frame was a process involving multiple stages. To begin with, the units of analysis were identified so that each questionnaire, interview and game-play video constituted a separate unit of analysis (Schreier 2012: 130). Next, the data was broken down by source and topic (Schreier 2012: 79). In practice, the coding frame was built in three main categorization cycles that involved leaving out irrelevant material sequences and segmenting the remaining material into units of coding, i.e. into sequences that can be meaningfully interpreted with respect to the categories (Schreier 2012: 127). Each categorization cycle expanded the coding frame to accommodate relevant criteria applicable to new data sources (Schreier 2012: 105). The first categorization cycle was done based on the questionnaire

form, which in turn had already been informed by the research questions. I drafted the coding frame outline based on key themes in the questionnaire, went through the answers twice topic by topic, and constructed the coding frame categories accordingly. The second cycle involved transcribing the interviews, identifying recurrent key themes, and repeating the coding procedure with the transcripts. I analyzed each interview transcript three times in order to make sure all relevant coding units have been identified and marked in the coding frame, starting with the broader themes and scrutinizing the data more and more closely each time. Finally, in the third cycle, I viewed video recordings of each group's game-play, made notes of important issues based on the hitherto prepared coding frame, and added final supplements into the coding frame. As Schreier (2012: 7) has put it, qualitative content analysis is a flexible method, as it allows the researcher to adjust the coding frame to better suit the material at any point of the analysis process, which is done in order to make the coding frame valid and reliable in the sense that its categories provide answers to the research questions.

As a result, the coding frame was built around six key themes (previous gaming experience, the game-play of *School Detectives*, group-internal cooperation, comparison of English and Swedish, two target languages, and foreign language classes), and it included 78 main categories that were further divided into subcategories. The coding frame was designed to fill the requirements of unidimensionality, mutual exclusiveness and exhaustiveness (Schreier 2012: 71-77). Firstly, each category was intended to capture only one aspect of the material so that for instance opinions and reasons were not mixed. Secondly, coding units were allocated to no more than one subcategory within a main category, but they could potentially, however, be coded into several main categories. Thirdly, the coding frame was designed to be exhaustive in the sense that every meaningful unit of the material was coded to at least one subcategory, and residual subcategories were sparingly included in order not to compromise validity. Furthermore, the requirement of saturation stipulates that each subcategory has to be used at least once in the analysis (Schreier 2012: 77-78). However, as the coding frame was initially formed in a concept-driven way based on the questionnaire and interview structures, there remained few instances of subcategories that were not identified in the data. These are valuable findings per se, and in these rare cases the saturation requirement was not fulfilled.

## 6 STUDENTS' PERCEPTIONS OF THE MOBILE GAME-BASED CLL SETTING COMBINING TWO TARGET LANGUAGES

This section will provide a qualitative overview of the results encoded in the coding frame. The findings will be presented thematically in the following order: previous gaming and language learning experience, general game-play, cooperation in groups, comparison of English and Swedish, two target languages, and foreign language lessons. The examples that enrich the analysis have been translated into English, and the original data extracts, mostly in Finnish, can be found as Appendix VI.

### 6.1 Previous gaming and language learning experience

The participants are listed below in Table 2 by using pseudonyms, alongside their gaming backgrounds and previous experience of studying multiple languages simultaneously.

Table 2. Participants and their background information

Group	Participant	Previous experience of playing mobile games	Previous experience of studying multiple languages simultaneously
Group 1	Marko	Some experience, not recently	No
	Noel	Yes	No
	Isabella	Yes	Yes
Group 2	Aino	Some experience, not recently	No
	Ilona	Some experience, not recently	No
	Olivia	Some experience, not recently	No
Group 3	Maisa	Yes	No
	Roosa	Some experience, not recently	No
	Kalle	Yes	No

As Table 2 illustrates, all students had at least some experience of playing mobile games: the majority had not played recently (5/9), but some were rather active gamers (4/9). Not everyone specified the language used in gaming, but the interviews revealed that in general games were most commonly played in English (8/9), followed by Finnish (3/9), Swedish (1/9) and Russian (1/9). Only Maisa (Group 3) stated that she tended to play alone, while the rest who commented (6/9) tended to play together with someone, at least sometimes. *Quizlet* or *Kahoot* were mentioned as familiar mobile games for learning purposes by the majority of the

students (6/9). It is also evident from Table 2 that the participants had no previous experience of studying more than one language simultaneously, with the exception of Isabella (Group 1), who had experienced using English as a reference language on Russian lessons.

## 6.2 Perceptions of the game-play in general

The *School Detectives* game was perceived in many different, sometimes opposing, ways, even by the same student. This illustrates that the students' perceptions of the game-play were not merely black or white, but rather multifaceted opinions on different aspects of the game. All students viewed some aspects of the game positively and other aspects negatively, and a majority had also neutral thoughts or viewed the game in some other way (5/9 and 6/9, respectively). In the following, I will elaborate on the reasons why the game-play was perceived in these multiple ways.

The game was perceived positively for a myriad of reasons. First of all, it was labelled interesting (7/9), fun (5/9), easy (4/9) and challenging enough (5/9). These findings are in accordance with previous research, as increased motivation, engagement and enjoyment are common student perceptions of mobile CLL (Kukulska-Hulme and Viberg 2018: 207) and of mobile game-based language learning (Huang et al. 2017: 967-968). Furthermore, they also show that the *School Detectives* game fulfilled the suggestion presented in the national curriculum to use games and gameful learning to facilitate the joy of learning (NCC 2016: 34, 49). In addition, the game was considered useful because it facilitated language learning (6/9) and promoted learning social skills (2/9). This is in line with previous studies which have shown that students regard mobile CLL as useful for learning (Liu and Chu 2010: 641, Berns et al. 2016). Furthermore, almost half of the participants (4/9) highlighted group work as one of the best things in the game-play. The opportunities for practicing social skills and learning languages will be discussed in depth later on (see sections 6.3 and 6.4, respectively).

A set of miscellaneous positive aspects of the game-play included physically moving to different places (1/9), making mistakes (1/9), the playing itself (1/9), not identifying any downsides of the game (1/9), and liking English (2/9). Physical movement to different places can be attributed to the location-based nature of the game, the benefits of which in an educational context are known as learning through exploration, accessing contextualized information, and increasing motivation to learn (Melero et al. 2015: 377). The notion that it is allowed to make mistakes in the game can be interpreted in the light of previous research in

the sense that games are known to lower the students' affective filter, and they thus make students less concerned about making mistakes (Richardson 2016: 35). Furthermore, mobile CLL reduces nervousness and embarrassment (Kukulska-Hulme and Viberg 2018: 207) and learning from mistakes in a mobile game-based CLL setting has been reported in previous studies (see e.g. Wong and Hsu 2016: 73). In essence, the game did not limit viewing the game contents or restrict the students' attempts to shoot videos or create other material. Hence, the students could view the contents as many times as needed or practice their language productions until being satisfied with the outcome. This finding was incidental, as the students were not specifically asked about making mistakes in the game, and only one student happened to mention it, and thus no conclusions can be drawn regarding the popularity of this view.

A major positive aspect of the game was solving the big mystery or the quests, as all students showed a positive orientation towards this. The majority liked the quests in general (5/9), and Roosa (Group 3) even emphasized that quests made playing easier and that solving problems in the game was fun. Some (3/9) highlighted that the main point was to finally succeed in a quest even though there were problems on the way. It is well known that the game elements of problem solving and challenge are prone to create excitement (Cornillie et al. 2012: 249). Quite a few students (4/9) appreciated getting encouragement upon finishing a quest. Encouragement was built into the *School Detectives* game in the form of coin items that included a thumb-up sign and an encouraging message that popped up on the screen upon quest completion (see Figure 1 in section 5.2.2.1). What is more, having completed all quests, the students were presented with a 'congrats' plaque, which Noel (Group 1) described as encouraging. Previous research has shown that quests and badges are highly valued as game elements by students (Perry 2015: 2314).

Interestingly, the only quest in the game involving AR attracted particular attention. Two students in Group 1 (Isabella and Marko) emphasized that they enjoyed *Quest 5: Open the padlock* because it involved solving something in a concrete way. Furthermore, Isabella elaborated on her argument as shown in Example 1.

#### Example 1

In the diary thing you needed to take the numbers in a peculiar way. (Isabella, Group 1)

The peculiar way Isabella mentioned in Example 1 refers to the only AR feature in the game: the students found out the correct combination to unlock the padlock that was attached to a calendar by scanning a letter with the iPad, which activated the AR view where the three numbers (9, 7, 4) were spelled letter by letter (see Figure 2).

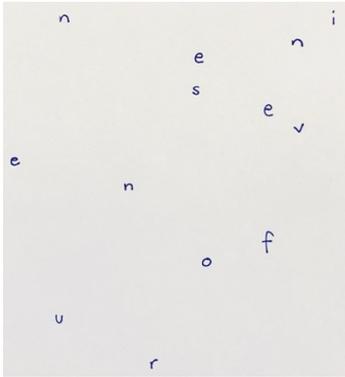


Figure 2. AR view in the game

Previous findings on the use of AR in mobile game-based language learning stipulate that AR not only makes learning tasks enjoyable but also increases motivation and engagement (Taskiran 2018: 893), which can be seen to be in line with the results of the current study. It should be noted, however, that the students were not directly asked about their favorite quests, which probably affected the fact that only two students gave special credit to the quest involving AR (Quest 5). Moreover, Aino (Group 2) mentioned that the padlock quest was tricky to understand. However, it is plausible that it was not the use of AR per se that was problematic, as the game directly instructed the players to scan the letter, which activated the AR view. Rather, it is more likely that the real cognitive challenge was distinguishing the three numbers among spread out letters, especially if one is not used to solving tasks like this.

Negative perceptions of the game-play were labelled in different ways. The most common reason for perceiving the game negatively was regarding Swedish as difficult (8/9), which will be elaborated on later (see section 6.4.3). Negative perceptions were also explained in terms of technical difficulties in using the iPad (2/9), which correlates with previous research findings: technical problems might lead to diminished engagement and increased frustration (Kukulska-Hulme and Viberg 2018: 214). In addition, difficulties in speaking English were mentioned (3/9), alongside with general difficulties in understanding quest instructions (6/9). Only Aino and Olivia (Group 2) explicitly mentioned the latter point as a difficulty, but video

observations of the game-play situations revealed that everyone in Groups 2 and 3 was struggling with the instructions of Quest 1.

The instructions of Quest 1 were in Swedish, and the students were requested to shoot a video where they present who they are, how old they are, and what their hobbies are to the Swedish-speaking in-game character, detective Håkan (see Quest in Figure 1, presented in section 5.2.2.1). Despite visual cues, both groups (Group 2 and Group 3) misunderstood the instructions and started to present information about detective Håkan. Consequently, I had to provide them with prompts such as “Are you going to tell Håkan or about Håkan?” (in Finnish) in order to guide them to the correct path. Prior to the start of Quest 1, the students had heard an audio recording where Håkan introduced himself in Swedish. My aim as a game developer was to build a genuine communicative and pragmatic situation where it would be natural for the students to introduce themselves to Håkan after hearing Håkan introduce himself, but this did not turn out to be the case. I speculate that the school environment might have affected the students’ thinking in the sense that they were probably used to being tested on listening comprehension, and thus they oriented to reciting what they had just been told about Håkan in the quest, instead of introducing themselves to him.

In addition to describing certain aspects of the game as difficult, the students presented language-related critique (5/9) or deemed some aspects irritating (1/9), boring (3/9), as well as complicated and confusing (4/9). The language-related critique included disliking Swedish (4/9), wishing English had a more prominent role in the game (3/9), and not having more languages that the students know in the game, such as Russian (1/9). As mentioned earlier, the role of English and Swedish and their parallel presence in the game will be discussed later (see sections 6.4 and 6.5, respectively). In terms of irritation, Isabella (Group 1) was irritated by the in-game character Håkan and the fake end of the game, i.e. when it first seemed that the game would end after completing Quest 5, but Quest 6 followed. However, her group member Noel did not agree with Isabella on the latter point, as his motivation was not diminished. The appearance of the game was considered a little boring by Kalle (Group 3), as it could have been more colorful. Thus, as an avid gamer, he was probably disturbed by the rather amateur layout of the game’s user interface.

An important criticism towards the game was that it at times seemed complicated and confusing. In Group 1, Isabella strongly felt that there was no common thread in the game,

and Noel tentatively agreed with her. In another group, Kalle and Roosa (Group 3) explained that confusion was at times created by the game design and logic, as it was sometimes difficult to know where to go in the game or how to find a quest. However, Roosa and Maisa (Group 3) pointed out on a positive note that the game was challenging enough precisely because one succeeded after having to think really hard. Furthermore, Noel (Group 1) argued that the game was easy, once one understood the logic. Thus, it seems that the game design challenged the students, which in the end was viewed positively by some students, while others held a more negative orientation to it.

The arguments for perceiving the game-play of *School Detectives* either neutrally or in some other way were far less multifaceted than the rationale for positive and negative opinions. The major reason for having a neutral attitude to the game was choosing the *quite ok* alternative in the questionnaire (6/9), whereas the miscellaneous perceptions included regarding the game-play situation as something new (3/9) or exciting (3/9).

It can be concluded that the students had multifaceted perceptions of the game-play of *School Detectives* – these mainly included positive or negative views on different aspects of the game, but there were also some neutral or miscellaneous perceptions that showed less variation. However, it seems that the positive perceptions were more prominent than the negative ones. First of all, considering that the game was developed for educational use, it was remarkable that a clear majority of the students perceived the game as useful for language learning. Another significant positive aspect was that all students liked solving the mystery or the quests, which may be interpreted as increasing motivation to play the game and thus to learn languages. The negative perceptions were predominantly related to regarding Swedish as difficult or being confused in the game. As will be explored in detail in the next section, the students managed to get through tricky parts of the game, even in Swedish, by relying on group-internal cooperation. Furthermore, it will be argued later that Swedish was not too difficult per se, but it was considered more challenging in relation to English, at least by some students (see section 6.4). Finally, the fact that some students perceived the game as complicated and confusing was no surprise, given that the cooperative game-play situation and using two target languages in parallel were new experiences for them. It can be assumed that if the students were more used to this kind of learning setting, the game-play as a whole would be far less confusing. Thus, the positive aspects clearly outweigh the negative ones that can to a great extent be overcome with becoming familiar with this kind of learning setting.

### 6.3 Perceptions of the cooperative group work

Cooperative group work was perceived overwhelmingly positively by the students, and only few negative and some neutral as well as miscellaneous aspects were identified. In the following, I will elaborate on the reasons behind these different perceptions and enrich the analysis with the impact of the roles, the cooperative exercise, and own effort on the cooperative experience, as these were key components of designing cooperation into the game-play setting (see section 5.2.2.3).

#### 6.3.1 Cooperative group work in general and with respect to the roles

A clear majority had positive perceptions of the cooperative group work (8/9), and even Marko (Group 1), who did not mention anything positive, had miscellaneous perceptions instead of negative ones. This is in line with previous research indicating that students perceive cooperative language learning positively in general, although their perceptions are not necessarily unanimous (Sun and Yuan 2018: 198). The cooperative group work was not only interesting (3/9) and challenging enough (1/9), but also fun (5/9), for instance because of being in a different group than usually and having a good group. However, the most important and most frequently mentioned aspect was that the cooperative group work was useful (8/9). It was useful in terms of learning social or group work skills (3/9), learning languages (7/9), and completing quests (3/9), the latter of which was a requirement for proceeding in the game. Example 2 illustrates the first two of these useful aspects of cooperative group work.

##### Example 2

It maybe like kinda like taught, teaches and kinda prepares for like social life and then maybe like just like I learned new words through others and so. (Noel, Group 1)

As Example 2 shows, Noel (Group 1) considered cooperative group work useful as it prepared him for social life and as he learned new words with the help of his group members. Interestingly, Noel seemed to have understood that practicing cooperative skills here and now will also benefit him in the future in all kinds of social life encounters. The language learning aspect in terms of English and Swedish will be discussed in depth in section 6.4.

Again, all except for Marko (Group 1) perceived the roles positively as part of the cooperative group work in the game-play. More specifically, the students considered the roles positively because they were interesting (2/9), fun (6/9), easy (2/9), and useful (7/9). Moreover, the roles were seen as useful because they brought versatility (7/9) and changing them allowed doing

and learning new things (2/9) as well as doing everything in cooperation (1/9). Learning new things through roles will be elaborated on later in this section, and thus I will focus on the latter point here in Example 3.

#### Example 3

But then we kinda, now when we kept changing them [roles], then everyone kinda, kinda did everything in cooperation. (Kalle, Group 3)

Example 3 illustrates how one of the students, Kalle in Group 3, reflected on the cooperative usefulness of changing the roles. In essence, assigning roles is a way of constructing positive interdependence within a cooperative group, which aims to result in the “sink or swim together” effect (Jolliffe 2007: 40). As Noel (Group 3) reflected, a lack of cooperation might have caused the group not to succeed in the game. The above quote illustrates that changing the roles contributed to creating a cooperative mindset where everyone in the group worked in cooperation in order to proceed in the game. It is worth bearing in mind that this aspect was specifically highlighted only by one student, but it still gives a glimpse of how role assignment and change can be perceived as facilitating cooperation.

The minority of negative perceptions of cooperative group work was concerned with either difficulties or boredom. To begin with, cooperative group work was considered difficult because one would rather have liked to do parts of the game quickly on one’s own instead of letting group members do their share of the work. This was vocally expressed by Aino (Group 2), and when being asked about the topic, the other group members (Olivia and Ilona) conformed to Aino’s view, as Olivia’s comment illustrates: “Pretty much the same as Aino”. This statement is rather ambiguous as it is not clear whether Olivia and Ilona agreed that Aino was like she had just described, or whether they applied these descriptions to themselves. However, the data supports the first interpretation, as Aino was the only one whose difficulties in sticking to the roles and letting others do their job were brought up several times not only by Aino but also by her group members, and they were also discernible in the video data. In other words, Olivia and Ilona did not struggle with letting others do their share of the group work but thought that this was Aino’s problem. Thus, it can be concluded that all three of them perceived not letting everyone do their share of the work to be a potential difficult aspect of cooperation. It is not surprising that some students regarded this cooperative aspect as difficult, as social skills have to be purposefully taught and practiced (see e.g. Johnson et al. 1994: 32, Jolliffe 2007: 40).

Furthermore, a majority of the students (7/9) identified some difficult aspects regarding the roles. Difficulties in staying in one's role were reported also by Noel and Isabella (Group 1) in addition to the members of Group 3 discussed above. Interestingly, Isabella (Group 1) mentioned not always staying in her role of iPad user because she voluntarily gave the device to others, as she no longer wanted to do the role-related duties, which can be interpreted as a sign of demotivation. However, she specified that she did not want to continue using the iPad after the fire drill, and thus the demotivation should be interpreted in the light of environmental factors rather than as being caused by the role per se. The difficulty of staying in one's role was also explained in terms of lacking patience to wait for others (2/9), which Noel (Group 1) elaborated on by explaining that he tends to get excited about these kinds of things. Yet another explanation by Aino (Group 2) and Noel (Group 1) was that they did not stay in the given role because they wanted to help others in their roles. In the light of previous research, helping one another is a way of facilitating the group's success through promotive interaction (Johnson et al. 1994: 29-30), and thus deviation from one's role might also have a positive effect, given that it is not too extensive in its scope.

The interview data revealed that the role divisions were violated due to using the iPad extensively while not being in the role of iPad user (Aino, Group 2 and Noel, Group 1) and due to reading out loud while not being in the role of reader (Aino, Group 2). In addition, it was observed in the video recordings that Roosa (Group 3) herself noticed that she was accidentally using the iPad on Kalle's turn, and she immediately gave the iPad back to Kalle. This contrasts with the rather intrusive behavior of not letting others manage their roles, as illustrated by the cases of Aino and Noel discussed above.

It seems that although the role design was intended to facilitate cooperation, this did not perhaps reach its full potential due to momentary inadequate adherence to the roles. As discussed in section 5.2.2.3, the role division was planned to be one way of establishing individual accountability into the game-play setting. However, as uneven distribution of work may potentially signal a lack of individual accountability (Johnson et al. 1994: 31), it can be concluded that the roles did not function properly as intended, because some students did not fully adhere to the assigned roles. Letting every group member use the device in the role of iPad user was prone to enhance engagement and reduce distraction (Melero et al. 2015: 380). However, it seemed that Aino (Group 2) and Noel (Group 1) were too eager to use the iPad, even on other's turn, which may have been harmful for cooperation, at least to some extent.

Furthermore, prior studies have shown that having only one device per group promotes cooperation, as the students orient not only to the device but also to the person holding it (Thorne et al. 2015: 281). However, it can be speculated that cooperation suffered at times in Groups 1 and 2, as the two students (Noel, Group 1 and Aino, Group 2) oriented too much to the device itself instead of orienting to their group members holding the device. Importantly, when asked to give improvement suggestions for the future, Aino and Noel mentioned giving more space for other's participation. This illustrates that although they at times violated the role division, sometimes with a good intention in terms of helping others, they both acknowledged the importance of letting everyone contribute to the group work.

Other role-related difficulties included technical problems in using the iPad in the role of iPad user (Isabella, Group 1 and Roosa, Group 3), and not knowing how to pronounce words in the role of reader (Maisa and Roosa, Group 3). Technical difficulties have been reported as examples of negative student perceptions towards mobile CLL in previous research, as they may lead to diminished engagement and increased frustration (Kukulka-Hulme and Viberg 2018: 214). It was speculated above that Isabella's (Group 1) demotivation to do the duties of iPad user was probably caused by the fire drill incident, but technical difficulties in using the device also likely contributed to it.

Rather surprisingly, Isabella (Group 1) regarded the cooperative group work in general as boring due to a male-dominant mix of students in her group, i.e. because she was the only girl in the group, as Example 4 illustrates.

#### Example 4

In my opinion there's nothing wrong with only having boys [in the group]. But I'm just very confused if there are only boys in my group. Because I'm used to having like at least one girl [in addition to me] in the group. (Isabella, Group 1)

It is evident from Example 4 that Isabella (Group 1) tried to be discreet and not to disapprove her two male group members, but she clearly was not comfortable with her group. Group dynamics is an essential part of cooperative group work and knowing the students and their characteristics is integral when making the group divisions. This aspect was taken into account, as the students were allocated into their groups by consulting their English and Swedish teachers, who can be assumed to know the students, but still this non-preferred group division took place. However, it is also important to learn to work with all kinds of people,

and unless the groups are all-boys or all-girls, it is inevitable that in a group of three someone has to be the only girl or boy in the group. Thus, stepping outside of one's comfort zone in the sense of cooperating as the only girl in the group might be a valuable experience for Isabella, at least in hindsight.

Quite a few students perceived the cooperative group work in general neutrally (4/9) and nearly all students (8/9) had a neutral perception towards the roles. The overall cooperative experience was described as *quite ok* (4/9), and this trend continued in the specific context of roles (5/9). Another minor reason for neutral perceptions in the narrower context of roles was that the roles were nothing special (Isabella, Group 1), while a major reason was not having to do much in a given role. This was mentioned with respect to the roles of time keeper (3/3<sup>2</sup>) and encourager (5/9). As Isabella, Noel, and Marko (Group 1) explained, in the role of time keeper one kept track of time on one's own without talking about it in the group. The group did not have to hurry to finish the game, so that might explain why they did not talk about time management with others.

Similarly, it was emphasized that one did not have to behave any differently in the role of encourager, which was attributed to two reasons: there was no need for more encouragement in the group (Aino and Ilona, Group 2), and it was enough to be oneself, as positivity and encouragement came naturally (Isabella and Noel, Group 1). However, even though members of Group 2 claimed there to be no need for more encouragement, occasional instances of encouragement were observable in the video recordings of the game-play, interestingly even by a student who was not in the role of encourager. Thus, it can be speculated that not all roles are necessarily needed in all groups, but I still advocate the usefulness of rotating different roles in cooperative learning in order to give the students an opportunity to practice different group work skills (Sahlberg and Leppilampi 1994: 118) and to create positive role interdependence within the group (Jolliffe 2007: 40).

A majority perceived the overall cooperative group work, and the roles in particular, in some other way (5/9 and 7/9, respectively). These miscellaneous perceptions were due to regarding the cooperative group experience as something new (4/9) or exciting (4/9). The same aspects were also mentioned in the narrower context of the roles (7/9 and 3/9, respectively). Kalle

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<sup>2</sup> The role of time keeper was only used in Group 1; Groups 2 and 3 had the role of reader instead.

(Group 3), Aino (Group 2) and Noel (Group 1) elaborated on the experience as something new by noting that they do not usually change roles in group work, and Noel and Aino added that they usually decide on the roles themselves. These aspects are illustrated in Example 5.

Example 5

Well we don't really divide any roles in any group work. It just like goes like naturally so that someone is always it [in a specific role]. (Aino, Group 2)

The difference that structured role division can make in group work is clearly illustrated based on Example 5. If the students are not directed to practice different roles, they are likely to always choose the same roles they are already familiar with and comfortable in, which presumably will not improve their general group work skills. Furthermore, Noel (Group 1) elaborated on the excitement caused by the change of roles in terms of eagerly waiting for one's turn for the next role. Thus, it can be speculated that having pleasant roles as part of the cooperative learning setting will also increase the students' engagement and motivation to play, and thus to learn languages.

### 6.3.2 The impact of the cooperative exercise on the cooperative group work

The students were asked about the effect of the cooperative exercise (see section 5.2.3 and Appendix I) on their group's cooperation, and it was perceived primarily positively (5/9), but also neutrally (2/9). Importantly, no student held a negative orientation towards it. The positive perceptions were mainly explained by using the strategies introduced in the exercise during the game-play (4/9). This is an important finding, as it illustrates that after the social and group work skills had been purposefully taught, the students were motivated to use them, both of which aspects are essential (Jolliffe 2007: 40, Johnson and Johnson 2009: 369). Marko (Group 1) explained that the cooperative exercise helped a little but did not specify this further. Importantly, Roosa (Group 3) pointed out that it heightened the group spirit but noted that this effect was not very big, as their group was already easy to cope with. Noel (Group 1) identified several positive effects of the cooperative exercise, as illustrated in Example 6 below.

Example 6

At least I maybe took others better into consideration because usually in group work I'm so that I want to do like something, and others are so that they don't want to participate. So here everyone like participated. [...] And we left like off-topic things out. (Noel, Group 1)

Example 6 shows how Noel (Group 1) perceived the cooperative exercise as contributing to taking others better into consideration, making everyone participate, and leaving off-topic things out of the game-play. In the light of this finding, the aim of the cooperative exercise as tuning the students into a cooperative mindset seems to have been fulfilled, at least for Noel in Group 1. The finding is also in line with previous research results that have indicated that students conduct less off-topic and disruptive behavior in cooperative learning settings (Johnson and Johnson 2015: 25). Interestingly, his group member Isabella seemed to provide a kind of counterargument to Noel's optimistic perception of everyone's participation, as she reflected on becoming a quieter participant than usually, because the game-play required so much focusing. Noel elaborated on Isabella's comment by characterizing her as a talkative person just like himself and agreed that she was much quieter during the game-play than usually, while pointing out that she still participated. However, Isabella's quieter participation should not be interpreted as being caused by the cooperative exercise, because she had mentioned earlier in the interview that the cooperative exercise had no effect on their group. Thus, her comment was merely a counter argument to Noel's optimistic opinion of everyone's participation during the game-play. Furthermore, the quieter behavior might also at least partly be explained by the unfavorable group dynamics, as was illustrated above with respect to Isabella's distress about being the only girl in the group (see section 6.3.1).

In essence, the cooperative exercise was perceived neutrally due to having no effect on cooperation during the game-play (3/9), for instance because the students already knew each other well and were used to working as a group (Aino, Group 2). Interestingly, Aino (Group 2) claimed that they did not really use the strategies introduced in the cooperative exercise to try to make Ilona participate more in the videos, which Olivia (Group) elaborated on by saying that one cannot force anyone. However, Ilona refuted these claims as she said that Aino videotaped her with a poker face, which can be interpreted as Aino videotaping Ilona against her will. Forcing someone to participate was not one of the strategies that the students came up with in the cooperative exercise, but this still illustrates that Aino did try to make Ilona participate more actively. However, no clear connection can be drawn between the cooperative exercise and Aino's rather intrusive attempt to make Ilona participate.

### **6.3.3 Satisfaction with the cooperative group work and own effort**

Despite of some eager students who did not manage to stay in their roles during the game-play, the groups seemed to function rather smoothly in cooperation, which is to a large extent

evident in the students' reflections on their satisfaction with the cooperation and their own effort.

A sign of successful cooperation was that all students were either very satisfied (3/9) or satisfied (6/9) with the cooperation within their groups. It should be noted that Maisa (Group 3) had originally chosen the option of *very satisfied* in the questionnaire but seemed later to conform to the other group members' opinion in terms of only being *satisfied* with the cooperation during the interview. A possible explanation in addition to peer pressure and conforming to other group members' views could be that the student simply genuinely changed her opinion during the interview, as she had more time to reflect on her experience and, essentially, as she was prompted to give reasons for her opinion in the interview setting. Thus, Maisa's (Group 3) subsequent answer given in the interview setting was considered here, although the effect of peer pressure cannot be ruled out.

The students did not explain reasons for their satisfaction in detail, but in general they mentioned smooth cooperation (4/9). Even though only one student mentioned the lack of conflicts as a reason for his satisfaction, when asked elsewhere in the interview about possible conflict situations, a majority reported that they had not encountered them (6/9). Furthermore, a clear majority (7/9) reported that there was enough room to participate in their groups, which can also be interpreted as a reason for satisfaction, although the topic was dealt with elsewhere in the interview. This finding shows that despite some students' difficulties in staying in their roles, there was enough interactional space for everyone.

Yet another underlying reason for being satisfied with the group's cooperation may be found in terms of the group's decision-making strategies, because being able to make decisions as a group likely contributes to satisfaction, whereas not being able to make decisions could be a dissatisfying factor. The majority of the students reported that they made decisions as a group through joint conversation (7/9), and some of them (4/9) complemented this with following the one who had a hunch or knew what to do in the game. Joint discussion and decision-making can be assumed to require higher-level interpersonal skills, such as synthesis of different ideas and considering disagreements in the group (Johnson et al. 1994: 68), and thus the students had a chance to practice these skills during the cooperative game-play. Moreover, previous research on mobile game-based language learning in groups has indicated that negotiation within the group is essential in order to advance in the game (Liu et al. 2016:

373). However, the strength of cooperation in heterogenous groups lies also in the possibility that the more knowledgeable group members can help the whole group advance in the game. A sociocultural learning effect has been detected in previous MALL studies where the groups were not even structured to be deliberately cooperative, as more advanced students helped the less-advanced ones with quests or the game system in general by giving the needed words or other information (see e.g. Perry 2015: 2313).

Dissatisfying aspects of cooperation in terms of lacking another girl in the group (Isabella, Group 1) and being frustrated because of having to let others do their share of the group work (Aino, Group 2) have already been discussed above (see section 6.3.1). Another dissatisfying aspect was presented by Roosa (Group 3), as she mentioned that sometimes nobody in the group understood or knew what to do next in the game.

Every group member's own effort plays a key role in the group-internal cooperation, and thus it is an important finding that the students were either very satisfied (1/9) or satisfied (8/9) with their own effort in the game-play. As seemed to be the case with Maisa (Group 3) above, Ilona (Group 2) answered *very satisfied* in the questionnaire but *satisfied* in the interview, and for the same reasons her subsequent answer given in the interview was considered here. Again, the students did not elaborate on reasons for their satisfaction in detail, but some arguments included doing one's best (2/9) and being satisfied with one's effort to participate (3/9). Dissatisfying aspects of one's own effort were exemplified as lacking motivation momentarily (Isabella, Group 1) and having sounded angrier than intended (Aino, Group 2).

To conclude, the students had mostly positive perceptions of cooperative group work, which was to a large extent attributed to its usefulness, especially in terms of the roles. However, the students also found some negative and neutral aspects related to cooperative group work. The negative perceptions were mainly due to few students who had difficulties in staying in their roles or one student who was not comfortable with her group. An interesting neutral perception was that some students felt that there was not much to do in some of the roles. In terms of miscellaneous perceptions, almost half of the students regarded the cooperative group work as something new, and the number was even higher in the narrower context of roles. As discussed above, a structured assignment and change of roles can potentially contribute to creating positive interdependence within the group, and thus enhance cooperation. Moreover, the students had predominantly positive perceptions of the impact of

the cooperative exercise on their group's cooperation. Finally, the students were satisfied with their cooperative group work and their own effort in the game-play, which provides further evidence of the students' positive overall orientation towards group work in cooperation during the game-play. The importance of cooperation will be elaborated further in the next section in terms of learning new words in cooperation with others.

## **6.4 Perceptions of English and Swedish**

In general, the students perceived the two target languages similarly in the sense that the game offered versatile opportunities for practicing both English and Swedish, and the students became more confident languages users in addition to learning new words in both languages, at least to some extent. However, most students preferred English to Swedish, and they were more satisfied with the group's in-game productions in English than in Swedish. Next, I will discuss these topics in detail and shed light on their underlying reasons.

### **6.4.1 Versatile opportunities for practicing English and Swedish**

To begin with, all students agreed that the game-play provided versatile opportunities for practicing English, as indicated by the questionnaire results. However, during the interview, Aino (Group 2) mitigated her view and changed her perception into a slight disagreement, as she would have preferred more writing tasks. Only six students elaborated on their reasoning, and versatile learning opportunities were explained in terms of speaking (3/9), writing (2/9), inferring (1/9), reading (1/9), and listening (1/9), which is in line with Perry's (2018: 339) notion of practicing different language skills on ARIS games. Furthermore, Olivia (Group 2) highlighted that there were new as well as known words in the game, and her group member Aino added that she liked the different conversations in English. Whether she referred to digital conversations with in-game characters or to conversations with her group members is not specified. The affordances for learning new words will be discussed in the next section. The versatile opportunities were contrasted with writing on the course book by Maisa, Roosa and Kalle (Group 3), and the latter can be viewed as a rather traditional method. Yet another insightful comment supporting the versatile learning methods for English was made by Isabella (Group 1) in terms of authentic language use, as shown in Example 7.

#### **Example 7**

I've got one from Spain, sometimes in class we got like a so-called pen pal from there, but just via e-mail. So I talked in English with him/her and I was then able to use that [language] [in the game-play], because I can't actually use it in class at all. (Isabella, Group 1)

In Example 7, Isabella (Group 1) contrasted the use of English in the game-play with communicating in English with a pen pal, as she was able to use the kind of English in the game that she had previously used in this authentic situation. Furthermore, she emphasized that she had not been able to use English in this way during the ordinary lessons. In the light of this result, it can be argued that the game provided an environment for authentic language use. This may be speculated to be attributed to the communicative context and the virtual environment for language learning, but this remains only at the level of speculation, as Isabella did not elaborate on her view further, unfortunately.

However, previous research has shown that creating authentic learning contexts is one of the educational advantages of mobile technologies (Fu and Hwang 2018). This has been noted also in the more specific context of location-based AR mobile games for language learning: *Mentira* enabled a meaningful learning experience in a local, Spanish-speaking neighborhood (Holden and Sykes 2011), whereas *Explorez* brought the relevant French learning context virtually to the students in an environment where the target language was not naturally used (Perry 2015), and in this respect *School Detectives* resembles the latter of these two studies. Furthermore, Sun and Yuan (2018: 189) emphasize that the authentic learning environment created by CLL is especially beneficial for “foreign language (L2) learners who are situated in a social and linguistic context with little opportunities to uptake and output a target language”. This description suits the context of the current study eminently well, as the school is situated in the Finnish-speaking part of Finland in contrast to the predominantly Swedish-speaking areas. Moreover, due to the global superiority of English as the language of popular culture and mass media, it can be assumed that the students are more likely to hear English than Swedish in their everyday life, but even in this case Finnish is the main language used in their environment. In this study, the students had an opportunity to use their language skills in the local school context that was turned into an authentic target language environment by the digital means of mobile game-based learning. Creating authentic language learning environments by using ICT is in line with the national curriculum (NCC 2016: 551, 594).

The majority of the students agreed that there were versatile opportunities for practicing Swedish (8/9). However, Noel (Group 1) agreed on this only to some degree, and his group member Isabella neither agreed nor disagreed. Some of the same reasons were mentioned with respect to Swedish as with respect to English, namely speaking (2/9), writing (1/9), reading (1/9), listening (1/9), not just writing on the course book (2/9), and authentic language

use (3/9), but this time only five students voiced their arguments. Roosa (Group 3) exemplified authentic language use in terms of learning to ask different things in Swedish from the detective. Moreover, opportunities for authentic language use in Swedish were also discernible in the video recordings of the game-play, for instance as Noel (Group 1) was wondering out loud in which language to write in Quest 3, as shown in Example 8 below.

Example 8

Do we write this in Swedish or in English? Because that Häkar [Håkan] didn't know English.  
(Noel, Group 3)

Opportunities for authentic language use were already discussed in relation to English above, but these examples that refer to authentic language use due to the Swedish-speaking in-game character, detective Håkan, provide further insight into the theme. It is evident from Example 8 that the existence of this Swedish-speaking character in the game made it inevitable to communicate in Swedish with him, and thus writing the message in Swedish was the only plausible alternative in this authentic virtual context. Furthermore, the same idea was also present in Roosa's (Group 3) reflection described above. However, as we will see below, Håkan was not perceived only in positive terms by the students.

Indeed, the Swedish-speaking game character Håkan was a major reason for diminishing the extent to which the opportunities for practicing Swedish were regarded as versatile. In Noel's (Group 1) opinion, Håkan was not interesting at all, and his group member Isabella criticized Håkan for not having a personality and pointed out that there was too much of him in the game. Consequently, it can be concluded that while detective Håkan created opportunities for authentic language use in the game, he was also considered boring and too dominant a feature in the game design by some students. In addition, Isabella and Noel (Group 1) explained their negative perceptions by criticizing the game for including too much reading. As discussed above, Aino (Group 2) criticized the game for not including enough writing in English. Thus, from a game-developer's perspective, the different modalities could have been utilized more evenly and there could have been less of Håkan in the game design.

Confidence in using languages is an integral part of language proficiency, and thus whether or not the students became more confident language users can be considered to belong to versatile opportunities for practicing English and Swedish. The results are not straightforward to interpret, as some students answered differently in the questionnaire as compared to the

interview. The rationale for considering the interview answers over the questionnaire answers in contradictory cases has already been given previously (see section 6.3.3), and the same policy of prioritizing the interview answers will be continued here. According to the questionnaire results, the majority of the students (6/9) agreed on having become more confident in using English, and the remaining students either disagreed (2/9) or had no opinion (1/9). However, during the interview, Roosa (Group 3) mentioned that her confidence in using English grew more than in using Swedish, although she had responded with neither agreement nor disagreement in the questionnaire. On the contrary, Aino (Group 2) reversed her opinion from agreeing on having become more confident in using English to disagreeing during the interview, as she said that she was already confident enough and did not need more confidence. In a somewhat similar manner, Olivia (Group 2) changed her perception from full agreement to agreeing to some extent during the interview.

The same problems of inconsistency recurred in the case of Swedish. Taking the starting point in the questionnaire results, a slight majority of the students (5/9) agreed on having become more confident in using Swedish, and the rest disagreed (4/9). However, it should be specified that Noel (Group 1) agreed on the statement only to some degree. The questionnaire and interview results differed from each other, as Olivia (Group 2) and Kalle (Group 3) had originally signaled full agreement but mitigated their view to some agreement, and as Roosa (Group 3) changed her perception from disagreement to some agreement. It is rather difficult to speculate why this part of the data was relatively discrepant in comparison to the remaining material. Despite some discrepancy in the results between the questionnaire and interview data, most students agreed on having become more confident language users during the game-play. This is in accordance with previous findings, as cooperative learning tends to improve students' psychological health in terms of higher self-confidence (Jolliffe 2007: 7).

#### **6.4.2 Learning new words**

The majority of the students agreed on having learned new words in English and Swedish during the game-play. The results are straightforward in case of English, as only two students (Aino, Group 2 and Isabella, Group 1) indicated disagreement, and the rest (7/9) showed agreement. However, Marko (Group 1) specified that only a few words were new to him. On a similar note, Isabella (Group 1) explained her disagreement in terms of already knowing surprisingly many words. Whether the students agreed on having learned new words in Swedish or not was a little more challenging to analyze, as there was some discrepancy in two

students' questionnaire and interview answers. The questionnaire results were in accordance with the English results in that two students disagreed and seven agreed on having learned new words in Swedish. However, during the interview, Aino (Group 2) and Roosa (Group 3) changed their perceptions from disagreement to some degree of agreement, which was elaborated on by Roosa in terms of not learning as much in Swedish as in English. Thus, the perceptions towards learning new words in Swedish became more positive during the interview. The possible reasons for discrepancy have already been discussed previously (see section 6.3.3), and for the same rationale the interview answers are considered here.

Even though learning gains were not specifically measured in the current study and the results of learning new words were merely based on the students' reflections and video observations, the findings seem to be in accordance with previous research. To begin with, cooperative learning has been proven to improve language learning outcomes in general and vocabulary acquisition more specifically (see e.g. Yavuz and Arslan 2018: 596). Improved language learning gains have been reported also in mobile game-based language learning contexts, both in cooperative learning settings (Wong and Hsu 2016: 75) and non-cooperative learning settings (Huang et al. 2017: 966), the latter of which was specifically focused on vocabulary acquisition. Interestingly, prior studies have shown MALL applications to improve foreign language students' performance, even though the students themselves considered the app only to have a limited effect on their language skills (Kétyi 2015: 310). Thus, the language learning effect may even be greater than reported in the students' reflections.

The students made use of two broad techniques for learning new words in English and Swedish during the game-play: inferring from context and getting help from a group member in cooperation. All students whose perception of the matter is known reported having used both strategies in English (8/9) and in Swedish (5/9). However, Noel (Group 1) specified that he learned more by inferring from context than by getting help from a group member. The video data offers a case in point example where both techniques are combined, as Olivia (Group 2) helps Aino, who encounters an unknown word *padlock* when reading the instructions for Quest 5, as Example 9 illustrates:

#### Example 9

Aino: "What's *padlock*?"

Olivia: "That padlock (pointing at the padlock). I think."

(Group 2, italics indicates that the word was said in English in the original)

Aino's turn in Example 9 exemplifies the strategy of getting help from a group member in cooperation, as she asks her group what the English word *padlock* means, while Olivia's turn is a clear instance of using context to learn words. Word learning in cooperation will be discussed in more detail below, so the contextual strategy will be in focus here. To provide a little more context for this conversation, Aino was reading the instructions on how to open a padlock that was attached to a calendar on a table beside the group. This context clearly primed Olivia to infer that padlock refers to the item attached to the calendar, as she referred to it with the pronoun *that*, followed by the Finnish translation of the word 'padlock', while pointing at the item in question. The addition of *I think* at the end of her utterance adds some hesitation to her conclusion, which supports the interpretation that she inferred the meaning of *padlock* from context, instead of merely using the context to explain a word she already mastered to her group member Aino. Previous research findings indicate that educational location-based mobile games are prone to provide access to contextualized information (Melero et al. 2015: 377), and thus using contextual information to infer word meanings can be seen as a rather natural feature of the game-play situation. Another example of inferring word meaning from context will be presented later as an instance where the outcome of learning was at risk of becoming incorrect, but the group managed to come up with the correct meaning in cooperation.

The students used several different strategies for learning new words in cooperation with others in the group. The interview data shows that the students identified and reflected on the strategies of asking one another what a foreign word means (2/9), letting the one who knew the meaning translate the word into Finnish (1/9), and trying to translate the words into Finnish together as a group (3/9). Kalle (Group 3) elaborated on the last technique in terms of putting real effort into thinking about the meanings of difficult words in cooperation. In addition, the following strategies were identified in the video data: asking how to translate a Finnish word into the target language, advising others on how to spell a word, and asking one another how to pronounce a word. In the light of previous research, helping others and giving them feedback contribute to promotive interaction, which in turn is a key element of cooperative learning (Johnson and Johnson 2009: 368-369). Thus, it can be speculated that these word learning strategies per se enhanced cooperation in the groups. It is not surprising that the students failed to specify the whole range of strategies they used, because this is quite an abstract topic to reflect on for 8<sup>th</sup> graders. In Example 10, Noel (Group 1) reflects on the effects of learning words in cooperation.

## Example 10

I have heard them of course, but they haven't stuck to mind. But now I at least remember them. And then I also learned about the group work, so that it also improved social skills. (Noel, Group 1)

As Example 10 illustrates, Noel argued that he finally learned the words that he had heard of previously as a result of negotiating their meanings in cooperation during the game-play. He referred to a specific situation where his group member Marko had helped him with the meaning of 'to draw' in Swedish. More specifically, Group 1 was working on Quest 3 where they were asked to write what Emily did or did not do the previous day based on picture cues in Swedish, and it was also hoped that the communicative context would direct the learners to use the past tense of the verbs, as the students were not explicitly instructed to use a certain grammatical structure. Noel himself asked for the meaning of 'to draw' and suggested *måla* 'to paint', but Marko provided the correct verb in the correct past tense form: *tecknade* 'drew'. Consequently, Marko not only helped with the word choice, but also with past tense grammar. Furthermore, Example 10 shows that Noel appreciated the cooperative aspect per se, as besides learning new words, he also learned about how to do group work and improved his social skills. In essence, learning languages and social skills in cooperation with others in a mobile game context was the whole point of the setting designed for this study.

In terms of learning new words, an interesting aspect is whether the outcome of learning was correct or incorrect. Most instances of word learning seemed to result in a correct outcome, but sometimes the students arrived at a wrong conclusion. Example 11 below is based on the video data, and it shows how students in Group 3 successfully negotiated the meanings of the verbs 'to draw', 'to paint' and 'to write' in Swedish, needed for Quest 3.

## Example 11

Kalle: What is like 'to draw'? Skriva ('to write')?  
 Roosa: No that's 'to write'.  
 Maisa: It was that  
 Roosa: Emily  
 Kalle: Something malade [målade] ('painted'). No, it was that  
 Roosa: It is 'to paint'  
 Maisa: You could find this in the Swedish course book, but I don't remember.  
 Roosa: Mm exactly. Well then  
 Maisa: Tecknade ('drew') wasn't it, tecknade ('drew')? Teckna ('to draw').  
 Kalle: Teckna ('to draw') is 'to write' in my opinion.  
 Roosa: No, it's not, as skriva ('to write') is 'to write'.  
 Maisa: It is skriva ('to write').  
 Roosa: Skriva ('to write') is 'to write'.  
 Kalle: Well I guess we will put it then.  
 (Group 3)

Example 11 demonstrates how Group 3 arrived at the conclusion that ‘to draw’ is *teckna* in Swedish and clarified the meanings of two other Swedish verbs, *måla* ‘to paint’ and *skriva* ‘to write’, during the process. The first step of cooperative meaning negotiation was Kalle’s opening line, as he explicitly asked how to say ‘to draw’ in Swedish and suggested *skriva*, which actually means ‘to write’. Roosa rejected and corrected this suggestion, which prompted Kalle to try again with *malade* [*målade*] ‘painted’. However, Kalle started to hesitate already at the end of his turn, and Roosa corrected this second suggestion. In the meantime, Maisa had started the word search process for ‘to draw’ and agonized over not remembering the word but recalling it to be found in the course book. A moment later she recalled the word as *teckna*, which was initially rejected by Kalle, as he thought that it meant ‘to write’. However, Kalle’s reasoning was rejected and corrected by Maisa and Roosa, and finally, Kalle accepted that ‘to draw’ is *teckna*. It is worth pointing out that although the students bounced back and forth between the present and past tense forms of the verbs, Group 3 ended up using the past tense in their writing production, even though it included a minor spelling mistake (*tecnade*). As already discussed above, the communicative setting of Quest 3 was planned to prompt the students to use the past tense.

It is crucial that the students processed each other’s suggestions critically and were not satisfied with which ever suggestions others had come up with. Instead, they scrutinized and compared these suggestions against their own language skills and judged them as either correct or incorrect on that basis. Furthermore, the students were willing to correct possible misunderstandings that their group members might have. These actions require some rather sophisticated interpersonal and small group skills in terms of challenging other member’s reasoning (Johnson et al. 1994: 68). In order to think critically and to reach a consensus within the group, the students needed to use high-level reasoning skills (*ibid.*). Moreover, previous research has linked increased high-level reasoning to higher achievement in cooperative learning settings (Jolliffe 2007: 7), which could be speculated to imply that the students learn the words better due to having to negotiate their meanings in cooperation.

A little different instance of word learning took place within Group 1, as Noel and Isabella originally misinterpreted the Swedish word *lärarrummet* ‘teachers’ room’ as meaning ‘the nurse’ based on the game context. In the interview, Isabella explained that she would have gone to meet the nurse based on the *lärarrummet* ‘teachers’ room’ cue, as something about pain had been mentioned previously in the game, and Noel agreed with her. This is because

the instructions had been preceded with a virtual conversation with Håkan, who complained about having a headache because the case of finding Emily was so difficult, and he also asked how the students were feeling. Thus, the authentic game context unintentionally primed the students to interpret the new Swedish word incorrectly. Luckily, the third group member Marko knew the real meaning of *lärarrummet* and could thus advise the whole group to go towards the teachers' room as a next step in the game.

However, cooperation did not always guarantee a correct outcome of word learning. A case in point is Example 12 that based on the video recordings illustrates how Noel and Isabella (Group 1) tried to come up with the word 'handcraft' in Swedish (*hantverk*).

#### Example 12

Noel: Write there jag hobbyer är ('I hobbies are')... What's hand?

Isabella: Hand ('hand') is hand.

Noel: Umm... Handcraft... Handjobba ('handwork'). Could it be?

Isabella: You can always try.

(Group 1)

Even though the outcome of word learning in cooperation was incorrect, as *handjobba* is not a legitimate Swedish word, Example 12 illustrates that the students were not afraid of applying their language skills and violating correctness in order not to compromise communicativeness. In essence, Isabella's last turn shows how she encouraged Noel to have a go with the more or less nonsense word he had come up with, even though Noel shows hesitation at the end of his turn. Moreover, the students knew the first half of the compound word correctly and improvised the ending, probably by resorting to their mother tongue Finnish, as it seems that they tried to translate the second half of the compound word from Finnish into Swedish. The second part of the Finnish compound word for 'handcraft' (*käsityö*) can in isolation be translated into Swedish as *jobb* 'work', which makes the nonsense word *handjobba* somewhat logical and understandable, not only for speakers of Finnish, but also for English speakers, due to the close resemblance between the Swedish *jobb* English *job*. Noel added a slight twist into this by turning the noun into a verb by adding the -a ending, but it nonetheless fulfilled its communicative purpose, as outlined above.

At this point, one might question the pedagogical potential of the *School Detectives* mobile game, as it allowed the students to produce incorrect words without correcting them. However, the intention was to let the students rely on their joint language resources in

cooperation and let them survive the game-play on their own as far as possible. The idea was also that the students could receive feedback on their in-game productions from the teachers later on. Thus, these possible misunderstandings or mistakes could be addressed later in class.

### 6.4.3 Language preference

Asking the students whether they preferred one target language over the other was not explicitly included in the questionnaire or the interview script in order not to set an unequal status of the languages as a default. Nonetheless, the topic of language preference was discussed during the interviews, as many students emphasized their preference for English and disfavor of Swedish. Consequently, the majority of the students (7/9) preferred English to Swedish, one student (Maisa, Group 3) highlighted liking both, and one student (Marko, Group 1) did not express his opinion clearly. However, as Marko (Group 1) was the only student to indicate that the difficulty level of Swedish was suitable and the only negative aspect he mentioned about either target language was that few Swedish words were difficult, it can be assumed that he preferred both languages in the game. Moreover, even if English was preferred, some students still perceived Swedish or at least some aspects of it positively. To my knowledge, previous research has not compared students' language preferences in the context of using two target languages in parallel during the game-play, but Sun and Yuan (2018: 198) found out that students perceived CLL positively irrespective of the target languages (Chinese, French or German) that were used one at a time on separate courses. What follows below is an elaboration of the underlying reasons for the students' different language preferences in the game.

English was liked for a myriad of reasons, and Swedish seemed not to be liked for opposing reasons. To begin with, English was labelled as fun or nice by a clear majority of students (8/9), whereas nearly half of the students (4/9) disliked Swedish. Disliking Swedish was evident not only through students' reflections in the interviews, but it was discernible also in the video data in terms of calling Swedish one's enemy (Isabella, Group 1) or explicitly stating that one does not like the Swedish language (Aino, Group 2). Moreover, during the interview, Isabella and Noel (Group 1) explained their disfavor of Swedish partly in terms of disliking the Swedish-speaking in-game character, detective Håkan, and this was also expressed by Aino (Group 2) in the video recordings. Other reasons for liking English included perceiving it as not boring (1/9) and quite ok (4/9).

Furthermore, English was described as not too difficult (6/9), especially in contrast to Swedish, which in turn was considered difficult by a majority (5/9). It should be noted that difficulties in Swedish were mentioned as a negative perception towards the game-play in general by slightly more students (8/9), as discussed in section 6.2. This indicates that fewer students considered this to affect their language preference in the game. More specifically, the students regarded Swedish as difficult due to having problems with understanding quest instructions (1/9), not being good at it in general (2/9) or speaking it (3/9), and having studied it for a shorter time than English (2/9). The latter is not a surprising result because the students had studied the advanced A syllabus in English since grade 3 and the intermediate B1 syllabus in Swedish since grade 7. Even though I had tried to take the lower proficiency level in Swedish into account in the game design, the students still perceived Swedish as difficult in general. However, Aino (Group 2) explained that the difficulty level of Swedish was not necessarily too difficult throughout the game, but it rather seemed more challenging than English because it was not as easy. Furthermore, Olivia and Ilona (Group 2) went on to explain that they preferred English because Swedish was so much more difficult that it reduced the enjoyment of gaming. Of course, this was not a desired outcome from the game design perspective. However, Maisa and Kalle (Group 3) explained that due to the difficulties in Swedish, they helped each other more with words in Swedish than in English, which can be interpreted as increasing cooperation within the group. Thus, perceiving Swedish as difficult potentially facilitated cooperation, which in turn can be seen as a driving force for coping with difficulties in the game-play.

Swedish was perceived also in positive terms, albeit not as extensively as English. As discussed above, it can be interpreted that two students (Maisa, Group 3 and Marko, Group 1) liked both languages and did not prefer one target language to another in the game. With respect to Swedish, Maisa regarded it as quite fun and Marko considered its difficulty level suitable, which stood out against the general opinion of perceiving Swedish as difficult. Moreover, the majority of the students (7/9) came up with reasons that supported at least some degree of positive orientation towards Swedish, although it was not necessarily liked as much as English. To begin with, the students (7/9) oriented at least somewhat positively to Swedish, even though it was more challenging than English. Some students (Kalle and Roosa, Group 3) specified having slightly positive mediocre perceptions of Swedish, while Aino (Group 2) regarded Swedish as quite fun but difficult. Interestingly, Noel (Group 1) claimed the game to have improved Swedish skills more than English skills despite the fact that he

preferred English and disliked Swedish. Example 13 below shows how Noel (Group 1) reflects on his rather paradoxical orientation to the boring but useful aspects of having Swedish in the game.

Example 13

It was kinda boring to have Swedish [in the game] because I prefer English, but on the other hand I also learned particular Swedish words. (Noel, Group 1)

As Example 13 illustrates, Noel acknowledged the usefulness of including Swedish in the game in terms of language learning, even though he did not prefer the language in itself. This is fascinating in the sense that even though the students tended not to like Swedish as much as English, they might still be able to move beyond the stage of language preference and instead consider the more universal benefits of including two target languages in parallel in the game, as will be discussed further in section 6.5.

Finally, the dominating view of English preference, largely due to its preferred difficulty level, was also in line with the students' satisfaction with the game productions in that the students were more satisfied with the productions in English than in Swedish. In terms of English, some students were very satisfied (3/9) and the majority (6/9) were satisfied. In case of Swedish, the majority (7/9) were again satisfied, but some (2/9) were dissatisfied. The students were not eager to elaborate on their underlying reasons for different degrees of satisfaction with the two languages, but some arguments were introduced. The suitable difficulty level of English in the game was highlighted as contributing to increased satisfaction (1/9), and dissatisfying aspects were attributed to pronunciation (1/9) as well as word order and placement of prepositions (1/9). Moreover, some students (3/9) explained being satisfied with the Swedish productions with respect to their skill levels and argued that their satisfaction was diminished because speaking Swedish did not happen naturally (1/9) and as producing Swedish was more difficult than English (2/9). Previous research on mobile cooperative language learning has shown that higher satisfaction is one parameter affecting increased motivation (Liu and Chu 2010: 641). In this light, the results can be interpreted as follows: satisfaction with the in-game productions in both languages may be seen as an aspect of increased motivation to practice the languages during the game-play, albeit English was more motivating than Swedish.

In conclusion, English and Swedish were perceived rather similarly in terms of versatile opportunities for practicing them during the game-play and gaining more confidence in using them. Moreover, the cooperative game-play setting offered opportunities for learning new words in both languages, both by inferring from context and by learning in cooperation with others. However, English was preferred to Swedish by the majority of the students, largely due to perceiving Swedish as difficult, which was also reflected in terms of the students being slightly more satisfied with the in-game productions in English than in Swedish. Nevertheless, preferring English did not necessarily prevent the students from liking some aspects of Swedish in the game as well. Especially the parallel existence of two target languages was perceived quite positively, as will be discussed in the next section.

### **6.5 Perceptions of using two target languages in parallel**

The simultaneous presence of English and Swedish as target languages in the game was perceived in a variety of ways. Most students perceived the parallel use of English and Swedish positively (6/9) or in miscellaneous ways (8/9), and some (3/9) identified negative aspects, while few students (2/9) held neutral perceptions. What follows is a detailed account of the underlying reasons for these different perceptions.

A major reason for positive perceptions of the simultaneous presence of English and Swedish in the game was considering it useful (6/9). This was specified in terms of learning both languages simultaneously, which is in line with Noel's (Group 1) argument about learning also Swedish words during the game-play despite of preferring English and regarding Swedish as boring, which was already discussed in the preceding section as Example 13. Consequently, Noel (Group 1) perceived the simultaneous presence of two target languages as a pro and a con at the same time. This view was also held by Isabella (Group 1), who agreed that one can learn both languages simultaneously, but she also presented some criticism, which will be elaborated on below when discussing negative perceptions.

Positive perceptions of the parallel presence of two languages were explained also in other ways. Another major reason was that the mix of relatively easy English and challenging Swedish was a good combination, and taken together, the differences made the game challenging enough (4/9). Furthermore, the presence of two target languages was seen as contributing to variation and versatility in the sense that one did not have to use the same language all the time (2/9). In addition, it was labelled fun (2/9) and interesting (1/9).

Importantly, although the difficulties in Swedish were seen as resulting in diminished enjoyment of playing the game, as outlined above in section 6.4.3, and even though some found the logic of language change confusing, as will be discussed next below, the existence of two target languages in the game was not a bad thing per se, as Olivia and Ilona (Group 2) as well as Noel and Isabella (Group 1) put it.

The parallel use of English and Swedish in the game was perceived negatively for different reasons. To begin with, it was perceived difficult (2/9) because there was no common thread in terms of when the language changes (Noel, Group 1) and because Swedish was considered difficult (Aino, Group 2). However, Noel's negative perception was not a dominant one, as he acknowledged the usefulness of learning both languages simultaneously. Essentially, it can rather be interpreted as critique towards the arrangement of the languages in the game, instead of criticizing the parallel presence of the languages per se. In the case of Aino, her negative perceptions towards the parallel presence of English and Swedish may be explained by her unequal language preferences, as she strongly preferred English and disliked Swedish (see also section 6.4). Moreover, she did not present any arguments to criticize the idea of the parallel presence of two languages per se. Thus, it can be concluded that Aino would not necessarily have negative perceptions of the parallel use of two languages, given that they were equally much preferred.

Another significant reason for perceiving the parallel use of English and Swedish in the game negatively was considering it confusing (2/9). Confusion was caused by experiencing the use of English and Swedish as incoherent, as Isabella (Group 1) strongly felt that there was no common thread in the game with respect to when to use English or Swedish, which was tentatively seconded by her group member Noel. Isabella's reasoning is demonstrated in Example 14.

#### Example 14

When in principle there was no common thread [in the game], so it was a bit detrimental that both languages were used simultaneously, which in turn made it confusing. (Isabella, Group 1)

As Example 14 shows, Isabella considered the parallel presence of English and Swedish confusing because there was no common thread in the game. It also illustrates that besides regarding the simultaneous use of the languages as confusing, Isabella also viewed it as detrimental. However, when asked whether Isabella would have preferred to have only one

target language in the game, she presented a counter-proposal in terms of keeping English and Swedish in the game but structuring their presence more clearly. In essence, Isabella suggested taking a break in between language change, for instance by having the first half of the game in one language and the second half in another language, which was agreed on by Noel. Moreover, it can confidently be argued that Isabella was not disturbed by the fact of using two different languages in parallel, but solely by the way in which this was executed, as she rejected the proposal of only having one target language in the game. Furthermore, she mentioned during the interview that she would also have liked the game to include yet another language that she knows, i.e. Russian.

Thus, what on the surface seemed to be negative perceptions towards the idea of using English and Swedish in parallel turned out to be caused by the unequal preference of English and Swedish (Aino, Group 2) or criticism towards way the languages were changed in the game (Isabella and Noel, Group 1), instead of necessarily disliking the general idea of studying multiple languages in parallel in this cooperative mobile game context. It is important to note that only Isabella and Noel perceived the parallel existence of English and Swedish in the current way as confusing, which means that the majority did not find this to be problematic. Indeed, the aim was to design the use of the two languages logically in the sense that the students would always interact in Swedish with detective Håkan or tasks directly related to him, while everything else in the game would be conducted in English. It can be concluded that even though some aspects of the parallel use of English and Swedish were perceived negatively, all students had also positive perceptions, except for Aino (Group 2), who also had miscellaneous perceptions in addition to negative ones in terms of this being a new and exciting experience.

There is not much to elaborate on the neutral perceptions of the parallel use of English and Swedish in the game, as the results merely showed that few students (2/9) described it as *quite ok* in the questionnaire, but there is a little more to say about the miscellaneous perceptions. Essentially, a slight majority of the students (5/9) reported that the experience was new to them, as they had not used English and Swedish in parallel previously. In addition, no other student besides Isabella (Group 1) had previously studied multiple languages simultaneously in general. Furthermore, quite a few students (5/9) considered the simultaneous use of English and Swedish to be exciting, which was exemplified by Noel (Group 1) in terms of not knowing which language will be used next in the game, i.e. whether it is going to change or

not. Thus, while two students (Noel and Isabella, Group 1) perceived the parallel use of English and Swedish as confusing due to not having a common thread in the game, one of them regarded this parallel presence simultaneously as exciting.

To conclude, the majority of the students perceived using English and Swedish in parallel in the game positively, mostly due to the usefulness of learning two languages at the same time. However, this simultaneous presence was also perceived negatively either due to an unequal preference of English and Swedish, or due to being confused by the numerous language changes in the game. Nonetheless, it was established that this criticism was directed at the very reasons outlined above, instead of targeting the general idea of studying two languages in parallel. Thus, it can be rather convincingly argued that having two target languages in the game was not a bad thing per se. Moreover, using two target languages was a new experience to a clear majority of the students, and a slight majority perceived this as exciting.

## **6.6 Perceptions of mobile game-based CLL as part of foreign language lessons**

In this section, the students' perceptions of the present mobile game-based CLL setting will be explored within the broader framework of foreign language lessons. The discussion will focus on two key themes, i.e. willingness to play a similar game again in the future and willingness to study English and Swedish on a joint lesson in general. Both topics were perceived predominantly in a positive way, and reasons for this will be elaborated on below.

### **6.6.1 Willingness to play a similar game in the future**

An overwhelming majority of the students (8/9) expressed their willingness to play a similar game again in the future, Isabella (Group 1) being the only exception. The most significant reason for continuing to play games of this kind was that the game was considered to take into account different learning styles (6/9). The students' personal learning style preferences that were mentioned to be in accordance with the game-play were listening (Noel, Group 1, Olivia and Ilona, Group 2), reading (Olivia and Ilona, Group 2), and doing instead of sitting down and being quiet (Noel, Group 1). It should be noted here that the students were not explicitly asked to reflect on their own learning styles, and thus this result can be considered as an incidental finding. While some students identified the game-play to suit well their own learning style preferences, others acknowledged the potential that the game had to offer for

different learners, even if the game-play was not in line with their personal learning style preferences, as is the case in Example 15.

#### Example 15

Well I- I mean I- at least that's not the best way to learn for me. But then it would be nicer and kinda a bit easier for someone else, as you wouldn't always have to write in class. (Aino, Group 2)

In Example 15, Aino (Group 2) skillfully reflected on the opportunities the game may offer for students whose preferred learning style does not include merely writing in class, even though she did not belong to this group of students herself. It was reported earlier in section 6.4.1 that Aino criticized the versatile opportunities for practicing the two languages in terms of the game not offering enough writing tasks, which makes sense now that she identified herself as a student who learns by writing.

Wanting to play a similar game in the future was argued for also in other ways. Marko (Group 1) stated that he would like to play again because he liked the game as a whole, and his group member Noel emphasized the nature of the game as fun in comparison to usual lessons. Furthermore, even though Isabella (Group 1) was not willing to play the game again, she admitted that it would be a more relaxed way of learning. Her negative perceptions will be discussed in depth below. Importantly, most students (6/9) highlighted that playing this kind of game should not substitute all teaching, as it brings more variety to the lessons. In essence, Kalle and Roosa (Group 3) expressed their concerns by comparing the situation to the current overuse of *Kahoot* and *Quizlet* in the classroom. This finding is in line with previous research results which have shown students to perceive mobile games as a useful supplement to attending regular classes (Gafni et al. 2017: 312).

As already briefly mentioned, only Isabella (Group 1) was unwilling to play similar games in the future. This was to a large extent argued for by stating that playing games was not the best learning style for her, as she learns more by reading and doing exercises from the book. Thus, Isabella did not take into consideration the perspective of how the game may benefit other learning styles in her class, and she judged the game solely based on whether or not she perceived it beneficial only for herself. Furthermore, another counterargument presented by Isabella was that playing a game did not really count as learning. This is a rather peculiar stance, and Example 16 below illustrates Isabella's nearly paradoxical reasoning.

#### Example 16

This is maybe a bit more relaxed way and you learn it [the foreign language] at the same time, but it's not for like learning. (Isabella, Group 1)

As Example 16 demonstrates, Isabella admitted that playing the game provides a rather relaxed opportunity for practicing language skills, hence learning simultaneously while playing, but she nevertheless did not regard this as suitable for really *learning*. Isabella did not elaborate on what in her opinion would constitute appropriate circumstances for *learning*, but it is still possible to speculate this based on inferences from her other utterances. It is plausible that she regarded the traditional teaching and learning style of working on the course book as an ideal circumstance in order for *learning* to happen, as this was her own preferred learning style. This interpretation would be in line with prior research demonstrating that students may perceive mobile CLL negatively because of doubting the novel method's influence on learning, which consequently leads to experiences of uncertainty (Kukulska-Hulme and Viberg 2018: 214). It is rather peculiar that Isabella nonetheless admitted learning to take place in a more relaxed way while playing. Thus, it might be reasonable to conclude that Isabella did not deny the potential of mobile games to facilitate language learning, but she did not believe this to be the best learning environment for herself.

#### 6.6.2 Willingness to study English and Swedish on a joint lesson

The students' perceptions were slightly more positive than negative or neutral regarding whether or not they would like to study English and Swedish on a joint lesson instead of studying the two languages on separate lessons, as is the current norm. To begin with, including this topic in the study was motivated by the emphasis on integrative instruction and multidisciplinary learning modules in the lately renewed National Core Curriculum for Basic Education (NCC 2016). However, it should be noted that the students did not experience this non-mobile language learning setting combining two target languages during the game-play. Instead, they considered the idea of general joint language lessons based on their perceptions of the mobile game-based cooperative language learning experience where two target languages were used in parallel. In the following, I will shed light on the students' different perceptions on the topic.

Almost half of the students (4/9) held a positive orientation towards the idea of studying the two languages simultaneously on an ordinary lesson. In accordance with the results of why the parallel presence of English and Swedish was perceived positively in the mobile game

context (see section 6.5), the scenario was motivated by its usefulness (3/9). Maisa and Kalle (Group 3) pointed out the opportunity for learning both languages simultaneously. In addition, Kalle emphasized the aspect of more variation, as one does not have to study the one and same thing for the whole lesson. Other reasons for positive perceptions were regarding the learning setting as fun or nice (3/9) or as more challenging but interesting (1/9). Moreover, Aino and Olivia (Group 2) rejected the idea of studying English and Swedish simultaneously on ordinary language lessons but accepted it as part of multidisciplinary learning module projects. This seems to indicate that the students were rather open-minded towards integrative instruction and multidisciplinary learning modules (NCC 2016) on the part of combining different languages.

While Marko (Group 1) had rather neutral perceptions of combining English and Swedish on the same language lesson, as he commented on it as *maybe ok* in the interview, some students (3/9) did not perceive the idea favorably, as was already pointed out with respect to Aino and Olivia (Group 2) above. Olivia (Group 2) argued that combining different languages would be confusing, which was echoed by Isabella (Group 1), who regarded the thought as distressing but refused to elaborate on the issue further. However, Aino adopted a slightly different perspective in terms of unequal language preferences, as is evident in Example 17 below.

#### Example 17

If you don't like Swedish as much [as English], then you want to enjoy the English lessons. It would be nice to keep them as their own lessons. (Aino, Group 2)

What Example 17 shows is Aino's concern about no longer being able to enjoy English lessons that she strongly prefers to Swedish lessons, in case the two languages were studied on a joint lesson. This is a very integral perspective to take into account when planning and designing teaching in accordance with the need to implement multidisciplinary learning modules and integrative instruction in Finnish schools (NCC 2016: 52). It is impossible to consider every student's personal subject preferences, but it would be ideal for the multidisciplinary projects to offer some variation in terms of the involved subjects, preferably allowing the students some freedom of choice.

As has been speculated in the literature, educational professionals may use applications and thus also mobile games, especially the ones using AR, as an attempt to change students' negative perceptions of language learning (Taskiran 2018: 869). The results of the current

study seem to be in accordance with this speculation to some extent for the following reasons. Even though Aino (Group 2) strongly disliked the idea of studying English and Swedish on joint lessons, she nevertheless was willing to play a game combining the two languages again in the future because it brings variety to lessons, albeit playing games was not even her preferred learning style. Furthermore, it is striking that Aino was willing to play the game again despite of not perceiving the parallel use of English and Swedish positively in the game. Her negative perceptions were due to preferring English and considering Swedish as more difficult, but she nevertheless perceived the simultaneous use of the languages as exciting. Thus, it can be argued that Aino was willing to put up with the simultaneous presence of her preferred English and disliked Swedish in the cooperative mobile game context, but she was reluctant to the idea in the traditional context of ordinary language lessons. It should also be noted that she perceived the idea of studying English and Swedish in parallel positively also as part of multidisciplinary learning projects, in contrast to the ordinary language lessons.

In sum, all students except for one were willing to play a similar game in the future, which was to a great deal attributed to the potential of the game to account for diverse learning styles in the classroom. Moreover, the students emphasized that this should be done by supplementing other teaching in order to bring more variety to the lessons. The rare perception of not wanting to play a game of this kind again in the future was explained by a mismatch between the student's preferred learning style and learning through playing games, in addition to doubting the novel method's potential for improving learning. Moreover, nearly half of the students perceived the idea of studying English and Swedish simultaneously on the same ordinary lesson quite positively, and some accepted this only as part of multidisciplinary learning projects, which would be in accordance with the principles of integrative instruction through multidisciplinary learning modules in the national curriculum (NCC 2016). An important reason for disagreement was worrying about no longer being able to enjoy instruction in the preferred language, in case also the less-preferred language was taught on the same lessons. However, it was speculated that increased motivation for language learning in the cooperative mobile game-based setting may potentially turn negative perceptions of this kind into tolerable, if not positive, perceptions. In the next section, I will answer the research questions, discuss the broader implications of the results, elaborate on the strengths and weaknesses of the present study, and give suggestions for further research.

## 7 DISCUSSION AND CONCLUSION

The aim of the current study was to investigate upper comprehensive school students' perceptions of a mobile game-based cooperative language learning setting that combined two target languages, i.e. English and Swedish. In essence, the current hot topic of digitalization in education was approached from the point of view of mobile games, and this was merged with cooperative language learning in the research setting. Moreover, my personal goal was to set a low-threshold example that language teachers without specific programming skills can design mobile games as teaching materials. The main aim of the study was approached through the following research question and its five subparts:

1. How do the students perceive this mobile game-based cooperative language learning setting that combines two target languages?
  - a) How do the students perceive the game-play in general?
  - b) How do the students perceive the cooperative group work as part of the game-play?
  - c) How do the students perceive English respective Swedish as target languages in the game?
  - d) How do the students perceive the use of two target languages in parallel in the game-play?
  - e) How do the students perceive the idea of mobile game-based CLL as part of foreign language lessons in general?

As the analysis of the findings in the preceding section showed in great detail, the mobile game-based cooperative language learning setting was perceived predominantly positively by the students. However, each thematic aspect was perceived in multiple ways, and thus also some negative, neutral and miscellaneous perceptions were present to varying degrees. The results are not widely generalizable, as this was a case study. Next, the students' multifaceted perceptions will be discussed in relation to the five subquestions that together shed light on the main research question. In addition, the broader implications of the results will be considered, which is followed by a discussion about the strengths and weaknesses of the present study. Finally, suggestions for further research will be provided.

## 7.1 Findings in relation to the research questions

The first subquestion was concerned with how the students perceived the game-play in general, and this was approached through the *School Detectives* game. The results showed that although the students' perceptions were rather multifaceted, the positive perceptions were most prominent. This was largely because the majority regarded the game as useful for language learning and some perceived it also as promoting learning social skills, which are in line with previous research indicating that students perceive mobile CLL to be useful for learning (Liu and Chu 2010: 641). Furthermore, all students liked the aspect of completing quests, which was interpreted as having a positive impact on the students' motivation to play the game, and thus to learn languages. This supports prior findings which stipulate that mobile CLL is prone to increase students' motivation, engagement and enjoyment (Kukulska-Hulme and Viberg 2018: 207). Increased motivation has also been attributed to location-based educational games (Melero et al. 2015: 377) and to AR features (Taskiran 2018: 893), and thus it was a little surprising that only one student highlighted physical movement around the school and only two students gave special credits to the quest involving AR. Moreover, it was demonstrated that one student liked the game-play especially because it allowed making mistakes. This is an important detail, because previous studies have indicated that students have learned from their mistakes in mobile game-based CLL settings (see e.g. Wong and Hsu 2016: 73), and mobile CLL has been reported to reduce nervousness and embarrassment (Kukulska-Hulme and Viberg 2018: 207).

The negative perceptions were mainly caused by considering Swedish or general quest instructions difficult. It was speculated that Groups 2 and 3 struggled with understanding the instructions for Quest 1 in Swedish because they followed a listening comprehension protocol in terms of reporting back on what they had just previously heard about the in-game character Håkan, even though they were asked to introduce themselves to him. A possible reason for the failure of this communicative situation is that the students did not necessarily understand the quest instructions in Swedish, which led them to resort to their prior experience of listening comprehension tasks. Some students' negative perceptions were explained in terms of being confused in the game, which was attributed to the game design in the sense that it was sometimes difficult to know what to do in the game and because a common thread was claimed to be missing.

The second subquestion aimed to shed light on how the students perceived cooperative group work as part of the game-play. The findings indicated that it was perceived overwhelmingly positively in general, most importantly due to its usefulness in terms of learning social skills, learning languages, and completing quests. It was established that the students liked the roles in the game and that the role distribution facilitated cooperation by creating positive interdependence (Jolliffe 2007: 40). Moreover, changing the roles potentially contributed to creating a cooperative mindset in the group. Negative perceptions of cooperation were to a great extent due to few students' difficulties in staying in their roles, and in one rather extreme case due to an unfavorable mix of genders in the group. It was not surprising that some students struggled with staying in their roles and letting others do their share of the work, as the students were not used to having assigned roles or changing them during group work. In essence, the students reflected on being used to always choosing the same role, if roles even were used in group work at all. Roles require mastering social skills, which in turn have to be purposefully taught and practiced (Johnson et al. 1994: 32). Thus, it is likely that these few students would stay better in their roles, given that they were provided with structured opportunities for practicing it. The neutral perceptions were mainly attributed to perceiving cooperation and roles as *quite ok* and to not having much to do in some roles. It was speculated that even though some roles were not perceived as having a major impact on the group, it is still useful to rotate different roles in cooperative groups, as the students have an opportunity to practice various social skills (Sahlberg and Leppilampi 1994: 118), and as they contribute to creating positive interdependence within the group (Jolliffe 2007: 40).

The analysis of how the students perceived cooperation was also enriched by taking into account the perceived impact of the cooperative exercise on the cooperative group work. The cooperative exercise was predominantly perceived to have a positive impact on the game-play, as the students used the strategies introduced in it while playing the game, which is important because it illustrates that the students were motivated to use the social skills previously practiced on purpose. Motivation to use the skills has been declared a key factor of effective cooperation (Jolliffe 2007: 40). Thus, it can be argued that the aim of the cooperative exercise as tuning the students into a cooperative mindset was fulfilled, with the exception of some students, who did not perceive it to have any effect on their group.

The students' satisfaction with the overall group work as well as their own effort was yet another aspect contributing to their general perceptions of cooperation. The results indicated

that the students were either satisfied or very satisfied with their cooperation, mainly due to classifying the cooperation as smooth, having enough room for participation, or not having major conflicts in the group. Furthermore, it was speculated that the ability to make decisions through joint conversation and resorting to the more knowledgeable group members likely contributed to the sense of satisfaction. It was also pointed out that decision-making as a group requires higher-level interpersonal skills in terms of synthesizing different ideas and managing disagreements (Johnson et al. 1994: 68). Consequently, the cooperative game-play provided an opportunity to practice higher-level social skills. Finally, the finding that the students were either satisfied or very satisfied with their own effort in the game-play strengthens the overall satisfaction with group-internal cooperation, as everyone's own effort is an integral part of the cooperative experience.

The third subquestion was concerned with the students' perceptions of English and Swedish as target languages. The results clearly demonstrated that the game-play offered versatile opportunities for practicing both languages. Some students highlighted the different modalities for learning (speaking, reading, writing and listening), which corresponds to Perry's (2018: 339) notion of practicing different language skills on ARIS. The versatility included also learning in an authentic context provided by the game. This result conforms to previous findings stipulating that authentic contexts are an educational advantage of mobile technologies (Fu and Hwang 2018) and of location-based AR mobile games in particular (Holden and Sykes 2011, Perry 2015). This finding is also in line with the national curriculum that encourages creating authentic language learning environments with the help of ICT (NCC 2016: 551, 594). It can be concluded that no clear difference was detected in the students' perceptions regarding versatile opportunities for learning English respective Swedish as target languages during the game-play. Diverse opportunities for practicing English and Swedish were also reflected on in terms of gaining more confidence as language users. This result is in line with previous findings that have shown that cooperative learning tends to result in higher self-confidence, and it is thus beneficial for students' psychological health (Jolliffe 2007: 7).

The students' perceptions of English and Swedish were also scrutinized in terms of learning new words in the two languages. The results demonstrate that there were no significant differences between English and Swedish in this respect, as the clear majority of students agreed on having learned new words in both languages. Although the learning gains were not specifically measured in the present research setting, and the results are merely based on the

students' reflections and the researcher's observations from the video data, this finding seems to be in line with previous research on improved language learning outcomes in mobile game-based cooperative language learning contexts (Wong and Hsu 2016: 75), and on vocabulary acquisition in particular in cooperative learning settings (Yavuz and Arslan 2018: 596).

The strategies for learning new words either by inferring from the game context or with the help of group members in cooperation were widely used. The authentic game context was already discussed above, and thus it is essential to focus on learning in cooperation here. Some of the identified strategies included asking one another what a word means, translating words together, and advising one another on how to spell a word. In the light of previous research, helping each other and giving feedback facilitate promotive interaction, which is an essential component of cooperative learning (Johnson and Johnson 2009: 368-369). Hence, these word learning strategies potentially enhanced the groups' cooperation. A student reflected on the power of cooperation by emphasizing that during the group work he learned to remember the previously heard words in addition to improving his social skills, which more or less captures the benefits of cooperation in the current research setting. Moreover, it was seen that albeit the outcome of word learning was mostly correct, on rare occasions the students were at a risk of arriving at a wrong conclusion due to misinterpreting contextual cues in the game, or they prioritized communicativeness at the expense of correctness in the course of negotiating unknown words in cooperation.

Most students preferred English, two students preferred both languages, and none showed explicit preference for only Swedish. The major reason for not preferring Swedish seemed to be perceiving it as difficult. Students' satisfaction with their group's in-game productions was in line with this, as the students were slightly more satisfied with their productions in English than in Swedish. Some negative perceptions of Swedish were specifically directed at the Swedish-speaking virtual character Håkan. Consequently, having a disliked character only in Swedish but not in English may have affected the students' preferences to some extent. It can be speculated that the students preferred English to Swedish because they were used to playing digital games in English, as all but one student reported on having played mobile games in English, which is in a sharp contrast to only one student who had done so in Swedish. Thus, it can be assumed that the use of English in the mobile game context was familiar and natural to the students, in contrast to Swedish. Moreover, the general attitude towards studying Swedish seems to be quite negative in Finland, which is also reflected in the

results of this study, as almost half of the students explicitly expressed disliking Swedish. The speculation that increased motivation caused by AR features may potentially reverse negative attitudes towards language learning (Taskiran 2018: 896) was not discernible in the present study: there was only one AR feature in the whole game, and it was related to the already preferred language English, even though the need for reversing negative attitudes would have been for Swedish.

The fourth subquestion aimed to shed light on how the students perceived the parallel use of English and Swedish in the game-play. It was established that most students perceived this positively, largely due to the usefulness of learning two languages simultaneously. Other reasons for positive perceptions were for instance that together the easier English and the more difficult Swedish made the game challenging enough, that their parallel use was considered fun, and that the language change brought more variation to the game-play. Few students criticized the parallel use of English and Swedish, either due to unequal language preferences or due to regarding the rather constant change of the target language in the game as confusing. Importantly, it was concluded that having two target languages in parallel in the game was not a bad thing per se. Furthermore, the parallel use of English and Swedish was a new experience for most students, as only one student had previously studied two languages in parallel. The novelty of the experience was also reflected in the fact that more than half of the students perceived it as exciting. Only one student did not express any positive perceptions towards having both English and Swedish in the game, largely because she strongly preferred English, but she nevertheless perceived the experience as exciting.

Finally, the fifth subquestion scrutinized how the students perceived the idea of mobile game-based CLL as part of foreign language lessons in general. The findings indicated that all except for one student were willing to play a similar game again in the future, largely because supplementing other teaching with the game-play would bring versatility into the classroom, and because the game would account for different learning styles. This is in line with previous research that has demonstrated students to perceive mobile games as a useful supplement to ordinary lessons (Gafni et al. 2017: 312). Unwillingness to play the game was explained by a different personal learning style and by doubting the novel method's impact on learning, the latter of which has been documented as an instance of students' negative perceptions towards mobile cooperative language learning also in prior research (Kukulska-Hulme and Viberg 2018: 214).

Based on the game-play experience, the students were asked about their willingness to study English and Swedish on a joint ordinary lesson. Nearly half of the students perceived this idea positively, whereas some rejected the idea, and a few students accepted it only as part of multidisciplinary learning projects (NCC 2016). The negative perceptions were explained in terms of worrying that this would be confusing or that including also a less-preferred language would reduce the enjoyment of learning the preferred language on the same lesson. As some rejected the idea as part of ordinary language lessons but perceived it positively as part of multidisciplinary learning modules, it was speculated that increased motivation in a mobile game-based cooperative learning setting like the one used in the present study may potentially make students more amenable to the idea of studying two target languages that are unequally preferred, in contrast to studying them simultaneously on ordinary language lessons. This tentative speculation was based on one student who was willing to play a similar game again in the future despite of not having explicitly positive perceptions of using two languages in parallel in the game, and who rejected the idea in the ordinary lesson context.

## **7.2 Implications of the findings**

The findings of the present study have several important implications. To begin with, the study illustrated that the *School Detectives* game was not perceived as a disconnected add-on to the overall classroom experience, and thus teachers are encouraged to experiment with ARIS in order to supplement their teaching with mobile game materials. As Holden and Sykes (2011: 7) have put it, “to be transformative, innovations, especially technologically-enabled ones, must seek to become a part of the classroom experience, as opposed to a disconnected add-on”. The findings showed that students wanted to play a game of this kind as a supplement to ordinary lessons. Furthermore, the game was largely based on the contents of the local English and Swedish syllabi and course books, and thus this technologically-enabled innovation was not a disconnected add-on, but a genuine part of the classroom experience. Moreover, the findings illustrated that the students perceived mobile game-based CLL as bringing more versatility to the lessons, and the *School Detectives* game itself was seen as offering diverse and authentic opportunities for language learning. However, in order to make the game-play even more integral part of the course curriculum, it could replace some of the previous course requirements, such as oral presentations, as has been done in previous studies (see e.g. Perry 2015, Holden and Sykes 2011).

Secondly, the study has important implications for some key themes in the National Core Curriculum for Basic Education (NCC 2016). The results suggest that increased motivation in the cooperative mobile game setting may possibly make students more amenable towards the idea of combining two target languages that are not equally preferred, even if this idea was rejected in the context of ordinary lessons. Thus, the game-play setting can be seen as fostering multilingualism in schools, which is an important goal presented in the national curriculum (NCC 2016: 44). In addition, this has implications for planning multidisciplinary learning modules (NCC 2016: 52). This is not only because the majority perceived the simultaneous presence of two different languages in the game positively, but also because some rejected the idea of studying multiple languages in parallel as part of ordinary language lessons but favored the idea as part of multidisciplinary learning modules. Thus, a cooperative mobile game setting involving multiple languages could possibly be a noteworthy way to increase multilingual awareness in schools, as the students resort to their language repertoires during the game-play, and also to design multidisciplinary learning modules by perhaps even incorporating other subjects besides multiple languages in the game.

Thirdly, my personal aim of showing that any language teacher without specific programming skills can design mobile games as teaching resources was fulfilled. Bernadette Perry, who developed a location-based AR game for learning French (*Explorez*) on ARIS, encouraged people interested in developing games for language learning not to feel intimidated by the technological aspect, as *Explorez* was the first game that she ever created herself (Field Day Lab 2016). I sincerely hope that this study succeeds in mediating the same message – I had only little prior experience of game design and MALL when starting this project, but I was dedicated and determined to teach myself to do it. In addition to familiarizing oneself with ARIS, I recommend language teachers to refer to the research-based and hands-on mobile pedagogy guide, aimed specifically at English teachers (Kukulka-Hulme et al. 2015).

Finally, the findings point towards the importance of educating language teachers to design their own or at least use readily available cooperative mobile games as teaching materials. The results demonstrated that an overwhelming majority of the students were willing to play a similar game again in the future as part of their language studies. Moreover, as the cooperative aspect of the game and the game-play in general were rather new experiences to the students, it can be argued that it would be beneficial to emphasize the potential of cooperative mobile games as teaching and learning resources already during the subject

teacher education in universities. For example, University of Jyväskylä seems to have taken a step towards the right direction by offering an elective course focusing on digital games and language learning. As a matter of fact, I visited the course to present my research project, and I hope to have succeeded in inspiring my fellow future language teachers to experiment with cooperative mobile games for language learning purposes. From my perspective as a language teacher student and future language teacher, it would be highly important for universities to continue the trend of offering topical courses, including digital games in language education, which offer hands-on practice in addition to theoretical knowledge.

### **7.3 Strengths and limitations of the present study**

The current study design had important strengths, but also some limitations. I will start by outlining the major strengths of the study. To begin with, the *School Detectives* game was rather good even though it was designed by an amateur game designer without much prior experience. This was evident because the game elements of quests, fun, encouragement, interaction, and authentic learning context were appreciated by the students. All students liked completing quests, which is not surprising, as the quests involved the game elements of objectives and challenge, which are known to motivate and stimulate as well as to excite, respectively (Cornillie et al. 2012: 249). In addition, more than half of the students regarded the game as fun, which is known to establish enjoyment, pleasure and motivation (ibid.). Many also liked getting encouragement, which happened mainly through the coin badges and provided the players with outcomes and feedback, known to facilitate learning and inform about progress in the game (ibid.). Moreover, an overwhelming majority perceived the cooperative group experience positively, and thus the game element of interaction can be seen as beneficial for active participation and interaction with others (ibid.). Finally, the results indicated that some students appreciated the authentic learning context of the game, which can be explained by the game elements of context and story, known to create enthusiasm and stimulation (ibid.).

Moreover, based on the reasons listed above and the finding that all but one student were willing to play a similar game again as part of their language studies, the students demonstrated intrinsic pleasure in the game-play, and thus the students' perceptions validate *School Detectives* as a game, as intended by the game-designer (Hubbard 1991: 221, as quoted by Cornillie et al. 2012: 249-250). This cannot be taken for granted, as often "the general impression of students is that the worst kind of game is an educational game, and that

educators have the worst ideas about what makes good games good” (Holden and Sykes 2011: 9). All this constitutes an important strength in the sense that if the design of the game had been a complete failure, this would likely have affected the students’ perceptions negatively, and thus the results might have been skewed due to poor game design.

Another major strength of the present research setting was versatile and rather extensive data material for a case study. The data was collected from different sources, primarily from individually filled questionnaires and semi-structured focus-group interviews in the cooperative groups, which were supplemented with video recordings and observations of the game-play. As was evident in the analysis section, there was occasionally some discrepancy between the students’ questionnaire and interview answers. It was reasoned that these answers were changed during the interview probably because the students had more time to reflect on their experience and they were asked to provide reasons for their answers, which is why the latter answers given in the interview were considered. Thus, the opportunity for the students to share their perceptions through multiple channels added reliability to the results. Moreover, supplementing the students’ self-reported perceptions with the researcher’s observations from the game-play data made the results even more reliable and extensive. The possible weakness of peer pressure in the interview setting will be discussed below.

In addition, the coding frame used in the present study was built through various coding iterations of the data, which increased the validity of this study, as the coding frame was adjusted to better suit the material during each categorization cycle (Schreier 2012: 7). In essence, validity in qualitative content analysis can be achieved either by having another person code part of the material or by recoding the material on one’s own (Schreier 2012: 34). Thus, the lack of another researcher to code some of the material did not compromise the validity of the present study, as I recoded the whole material several times. Furthermore, reliability in qualitative research can be achieved by analyzing the material systematically, making the procedure transparent to others, and showing how conclusions were drawn (Steinke 2004, as quoted by Schreier 2012: 27), which are hoped to be evident in this study.

Finally, yet another strength of the current study is that it can be characterized as cutting-edge research on a novel topic. The present study not only combined MALL and cooperative learning, i.e. mobile CLL, which has already attracted previous research attention (see e.g. Kukulska-Hulme and Viberg 2018), but it also had the novel aspect of including two target

languages in parallel in the game-based learning setting. Moreover, cooperative language learning was designed into the game-play setting in accordance with the five main principles of cooperative learning that constitute its fundamental theoretical foundation (Johnson et al. 1994), whereas prior research has tended to use a specific cooperative structure (see e.g. Holden and Sykes 2011). As Johnson and Johnson (2015: 2) have put it, “the future of cooperative learning depends on its being part of a cycle of theory-research-practice”. It is hoped that the outcome of this study encourages language teachers to conduct cooperative language learning in the mobile game setting in the future, and even to include several different languages in the game. Thus, this study has potentially strengthened the future of cooperative learning in the novel context of studying two languages in parallel in a cooperative mobile game setting.

However, the present study had also its own limitations. Even though it was outlined above that the game was rather successfully designed, incidental findings showed that it had also some weaknesses in terms of a little boring appearance of the user interface and a disliked in-game character, detective Håkan. An avid gamer criticized the appearance of the game as lacking color. However, this is something that a game designer could not change, as the layout is determined by ARIS. Quite surprisingly, the Swedish-speaking detective Håkan attracted some criticism, as he was disliked by one student due to being too frequently present in the game and causing irritation. Moreover, another student perceived him to diminish versatile opportunities for practicing Swedish. Perceiving a specific game character this negatively indicates that this aspect of the game could have been more successful, and this is certainly a considerable improvement suggestion for possible future iterations of the game. However, these weaknesses were not extensively present in the data, and thus it can be stipulated that they did not skew the students’ overall perceptions of this mobile game-based cooperative language learning setting.

Another limitation was that the present research setting did not utilize the full potential of mobile-assisted language learning in terms of making learning ubiquitously available anywhere and anytime. This concern has been raised already previously, as it has been claimed that most MALL studies do not fully exploit the potential of mobile devices in extending learning outside of the classroom, as learning could happen any time during students’ daily activities (Levin et al. 2002, as quoted by Holden and Sykes 2011: 4). However, ARIS as a platform for designing mobile games has the potential to make learning

ubiquitous, but this merely was not feasible in the context of the current study, as the cooperative side of the research setting necessitated the students to be present at the same place, at the same time.

A third weakness of the present study was related to the design of some of the five main cooperative principles. In other words, individual accountability and group processing could have been structured more clearly into the game-play. Individual accountability was to a great extent designed to be established through the roles, and as was seen, some students did not stay in their assigned roles, as they took over also their group members' roles. This can be considered detrimental to individual accountability, as unequal distribution of work may potentially signal a lack of it (Johnson et al. 1994: 31). Thus, individual accountability could have been strengthened in the game-play by adding more powerful ways of establishing it. For instance, an easily implementable strategy would have been to inform the students prior to the start of the game that in the end one of them will be asked to report back to me how they solved the mystery. The strategy of asking one individual at random to provide an answer for the whole group after the cooperative activity is known to structure individual accountability (Jolliffe 2007: 40). Furthermore, the element of group processing could have been improved by providing the students with more individual feedback. The students did not receive individual feedback from others systematically, as they merely reflected on their satisfaction with their own effort and their group's overall cooperation. The systematic implementation of individual feedback was not feasible within the scope of the current study, even though it has been proven to be more effective than feedback directed at the whole group (Archer-Kath et al. 1994).

Yet another limitation of this study is that the game was played only one group at a time, and thus the more realistic option for a full class implementation of the game-play in terms of having multiple groups play the game at the same time was not tested in the current research setting. Similar limitations of not testing the cooperative ARIS game in a whole-class setting have been reported on previously (see e.g. Bressler 2015: 96). However, the arrangement of one group playing at a time was motivated in this research setting because it enabled observing each group's game-play from beginning to end. Moreover, the available video recording equipment would not have been numerous enough to record three group's game-play at the same time. It can be speculated that the situation where multiple groups play the game simultaneously is more chaotic, and some problems are potentially likely to emerge in

this setting. Potential problems are for instance bottleneck locations for scanning QR codes, the risk of some groups following stronger groups instead of relying only on their own group to proceed in the game, and the possibility that groups start competing against each other and thus rush through the game (Bressler 2015: 96-97). Nonetheless, these potential problems may be overcome, at least to some extent, for instance by spreading the groups to different locations at the start of the game in order to reduce overlap (Bressler 2015: 97).

Finally, conducting focus group interviews had its own limitations in the current research setting. In essence, group interviews entail the risk of peer pressure, as some participants might feel pressured to follow the general consensus of the group instead of expressing their genuine opinions (Crawford 1997). Thus, peer pressure may explain why some students changed their original position, as reported in the individual questionnaires, to conform to the general consensus within the group in the interview setting. However, it was argued that the changed perceptions may also have been attributed to the nature of the interview setting, as it allowed more reflection time and the students were often asked to elaborate on their perceptions by giving reasons for them. Thus, the interview setting may indeed have revealed the participants' genuine perceptions. Nonetheless, the possibility of peer pressure's impact cannot be ruled out. Another possible downside of the group interviews was that every student's opinion on each topic was not always gathered, since some questions remained unanswered by few students. This was probably due to the natural flow of conversation in the interview setting, and the topic may sometimes have moved forward too quickly before everyone had had a chance to comment on it. However, this problem was proactively taken into account in the sense that the most important broad topics were already covered in the individually filled questionnaire, whereas the more detailed questions during the interviews were elaboration on these topics. Moreover, within the practical time restrictions for data collection in this study, it would not have been feasible to arrange individual interviews for each participant.

#### **7.4 Suggestions for future research**

The current study revealed plenty of interesting results, but there still remains multiple crucial aspects to research in the context of mobile game-based cooperative language learning. To begin with, research should be conducted in order to measure whether or how much students actually improve their language skills during the game-play by using pre-tests and post-tests. Especially in terms of vocabulary acquisition, the findings of the current study based on the

students' reflections suggest that the students' learning gains were indeed improved during the game-play. This would be in line with a prior study on mobile game-based CLL that indicated that the students' learning gains were improved in terms of Chinese character formation (Wong and Hsu 2016: 75). It would, however, be important to conduct further research with more closely related languages. Furthermore, it can be speculated that the language learning effect is potentially even higher in reality than what the students' reflections suggest, as a prior MALL study has shown that although the foreign language students' performance was improved statistically significantly, the students themselves considered the app to only have a limited effect on their language skills (Kétyi 2015: 310).

Secondly, conducting replica studies with the same and other language combination would likely provide new insights into the effect that language preferences have on the students' perceptions of mobile game-based CLL. Moreover, unequal language preferences between English and Swedish were not taken as a default in the present study, but the findings suggested that unequal language preferences affected how some students oriented to the idea of studying multiple languages in parallel. Thus, it might be useful to explicitly find out about the students' language preferences in advance, so that the combinations could include two equally preferred languages, two disliked languages, and two unequally preferred languages, as was the case mostly in the current study. Especially in the context of two equally preferred languages, the results could provide insights into the effect of the mobile game context on how the students perceive the parallel use of two languages, i.e. whether or not students are more favorable towards the general idea in the mobile game context as compared to the ordinary language lesson context. Replica studies with another participant population may take the rather unique coding frame developed for the current study as a starting point and further modify it to better suit their data.

Thirdly, in order to see if the trends in the findings of the present case study can potentially be more broadly generalized, similar research should be conducted at a larger scale in terms of involving significantly more participants. However, this may not be easily feasible, as the research setting requires quite extensive resources in comparison to for instance administering an online survey.

Yet another suggestion for future research is conducting similar studies with long-term cooperative learning groups. In essence, the cooperative groups in the present study were

formed solely for the purposes of this one-time game-play, and it would be interesting to see whether the cooperative aspect of the game-play setting would have an even more prominent status in long-term cooperative groups. Indeed, Fu and Hwang's (2018: 136) review on trends in mobile technology-supported cooperative learning indicated that most research used formal groups (lasting from one session to several weeks), and the authors called for more research on long-term cooperative learning groups.

Moreover, it would be important not only to focus on the students' perceptions but also to take language teachers' perspective into account, as they both have an effect on the success of cooperative learning and teaching (Sun and Yuan 2018: 189). Thus, further studies could research whether language teachers would be able, eager or willing to experiment with mobile game-based cooperative learning in their foreign language classrooms. Previous research has investigated foreign language teachers' perceptions of CLL in Finland, and the results demonstrated that despite quite positive perceptions of cooperative learning, the teachers' theoretical and practical knowledge of it was rather vague (Pitkäranta 2000). This study was conducted nearly two decades ago, and thus more recent research is needed in the Finnish educational context. Importantly, cooperative learning was not examined in a mobile game-based learning context in this study, and it can be assumed that the results would be similar or even more tenuous in the mobile game context, as this combination has not yet been firmly established in the field of language education.

Finally, the mobile game created for the purposes of this study has a great potential to be broadened into a comprehensive multidisciplinary learning module (NCC 2016) by integrating other subjects from different fields into the game, but this step was not taken in the present study. How students perceive the idea of mobile game-based cooperative learning as part of multidisciplinary learning projects in general or with respect to different subject combinations remains to be researched. However, the findings of the current study tentatively suggest that multidisciplinary learning modules in the form of mobile games played in cooperation may be perceived rather positively by upper comprehensive school students.

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## APPENDICES

### Appendix I: Cooperative Exercise (English translation)

Modified based on exercise 92 and Appendix 14 in Toivakka and Maasola (2012: 184).

**Aim:** To sensitize students to cooperation in the game-play setting by 1) anticipating possible problems and 2) discussing how they could possibly be solved, and to support building the group spirit.

“The aim is to ponder difficulties in conversation: what kinds of problems one may encounter and how one could manage them. How can talkers handle and face the difficult situations? Learning self-knowledge and interpersonal skills.”

#### Preparations:

- Print the paper slips that include the three difficulties in interaction and the related questions
- Pens/pencils for the students in case they want to make notes

**Duration:** approximately 20min

#### Stages:

- 1) The lead-in (5min)
    - The game will be played in groups of three, so it is important to pay particular attention to cooperation. Conversation is an important part of cooperation, but sometimes there are problems on the way.
    - Have you ever noticed any interactional problems when working as a group?
      - o Quite free discussion based on the students’ prior experiences
      - o E.g. in group work or in general when talking with others in a group. Did all participate equally much? Did you stay on the topic? Were there disagreements?
    - Wrap-up
  - 2) Discussing the three difficulties in random groups (5min)
    - Going through the aims of the exercise
    - One topic for each group
      - o Topics and their corresponding discussion questions are presented in the appendix.
      - o The groups are formed so that they include only one person from each game-play group:
- Topics:

  1. Dominant participant (Marko, Aino, Kalle)
  2. Shy participant (Noel, Ilona, Maisa)
  3. Conflicts and discord (Isabella, Olivia, Roosa)
1. Pondering the answers on one’s own
  2. Sharing ideas in the groups
- 3) Forming the game-play groups and presenting the groups’ topics (5min)
    - The researcher divides the students into predetermined game-play groups so that each group has one person from each topic (1–3). The students are told that they will play the game in these groups later.

- The game-play groups:

  1. Marko, Noel, Isabella
  2. Aino, Ilona, Olivia
  3. Kalle, Maisa, Roosa

- Each topic is presented by one of the group members and discussed together in the groups: Do you have any other ideas? What do you think about the suggested solutions?
- 4) Wrap-up and summary (5min)
  - Were the aims of the exercise fulfilled?
    - o Did you come up with ideas for managing difficult interactional situations?
    - o Wrap-up of concrete ways to manage these situations
  - Did you notice any of the discussed problems in your group work?

### References:

Toivakka, S. and Maasola, M. (2012): *Itsetunto kohdalleen! Harjoituksia itsetuntemuksen ja vuorovaikutustaitojen oppimiseen*. Jyväskylä: PS-kustannus.

### Appendix: Possible problems in conversation

#### 1. Dominant participant

- How could you try to moderate a dominant participant in a conversation so that he/she doesn't lose his/her face?
- What could you say to him/her?
- Try to come up with concrete suggestions.

#### 2. Shy participant

- How could you support and encourage a shy participant in a conversation?
- How could you make him/her participate?
- Try to come up with concrete suggestions.

#### 3. Conflicts and discord

- What can you do if the atmosphere seems to be tense?
- How could you manage and prevent conflicts from occurring?
- Try to come up with concrete suggestions.

## Appendix II: Observation grid (English translation)

Place: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_ Group: \_\_\_\_\_

	Cooperation and interaction	Language use		
		English	Swedish	Finnish
<b>The game</b>				
<b>Roles</b>				
<b>Problems</b>				
<b>Well-managed situations</b>				
<b>Miscellaneous: Who? What? Where?</b>				

Game stage \ Roles	1. reader / time keeper	2. iPad user	3. encourager
<b>Beginning</b>			
<b>Role change 1</b>			
<b>Role change 2</b>			

**Notes:**

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### Appendix III: Questionnaire (original in Finnish, translation in English)

**Kysely School Detectives-pelin pelaamisesta** Nimi: \_\_\_\_\_

1. Mitä mieltä olet pelistä? Jatka väittämää sopivalla tavalla ja ympyröi vastauksesi. Voit valita niin monta sopivaa kohtaa kuin haluat. Peli oli mielestäni...

mielenkiintoinen	jännittävä	ärsyttävä
hauska	ihan kiva	tylsä
helppo	sopivan haastava	vaikea
hyödyllinen	jotain ihan uutta	haitallinen

Jotain muuta, mitä? \_\_\_\_\_

2. Mikä oli kivointa pelaamisessa?

---



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3. Mikä tuotti hankaluuksia pelitilanteessa?

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4. Miltä pelaaminen ryhmässä tuntui? Ympyröi vastauksesi. Voit valita niin monta sopivaa kohtaa kuin haluat.

mielenkiintoiselta	jännittävältä	ärsyttävältä
hauskalta	ihan kivalta	tylsältä
helpolta	sopivan haastavalta	vaikealta
hyödylliseltä	uudelta	haitalliselta

Joltain muulta, miltä? \_\_\_\_\_

5. Kuinka tyytyväinen olet ryhmäsi yhteistyöhön? Ympyröi vastauksesi.

erittäin tyytyväinen      tyytyväinen      tyytymätön      erittäin tyytymätön

6. Millaista oli toimia eri rooleissa pelin aikana? Rooleja olivat ääneen lukija, iPadin käyttäjä ja rohkaisija. Ympyröi vastauksesi. Voit valita niin monta sopivaa kohtaa kuin haluat.

mielenkiintoista	jännittävää	ärsyttävää
hauskaa	ihan kivaa	tylsää
helppoa	sopivan haastavaa	vaikeaa
hyödyllistä	uutta	haitallista

Jotain muuta, mitä? \_\_\_\_\_

7. Kuinka tyytyväinen olet omaan työskentelyysi pelin aikana? Ympyröi vastauksesi.

erittäin tyytyväinen      tyytyväinen      tyytymätön      erittäin tyytymätön

8. Millaisia mahdollisuuksia peli tarjosi englannin ja ruotsin harjoitteluun? Alla on esitetty väittämiä. Ympyröi vastauksesi sen mukaan, oletko samaa mieltä (☺) vai eri mieltä (☹).

- |   |   |   |
|---|---|---|
| a) Englantia pystyi harjoittelemaan monipuolisesti. | ☺ | ☹ |
| b) Ruotsia pystyi harjoittelemaan monipuolisesti.   | ☺ | ☹ |
| c) Opin uusia sanoja englanniksi.                   | ☺ | ☹ |
| d) Opin uusia sanoja ruotsiksi.                     | ☺ | ☹ |
| e) Sain lisää rohkeutta käyttää englantia.          | ☺ | ☹ |
| f) Sain lisää rohkeutta käyttää ruotsia.            | ☺ | ☹ |

9. Kuinka tyytyväinen olet ryhmäsi englannin- ja ruotsinkielisiin tuotoksiin pelissä (videot, tekstit, äänitiedostot)? Ympyröi vastauksesi.

- a) englanti:
- erittäin tyytyväinen      tyytyväinen      tyytymätön      erittäin tyytymätön

- b) ruotsi:
- erittäin tyytyväinen      tyytyväinen      tyytymätön      erittäin tyytymätön



3. What was difficult when playing the game?

---



---

4. How was it to play the game in a group? Circle your answer. You may choose as many suitable options as you want.

interesting	exciting	irritating
fun	quite ok	boring
easy	challenging enough	difficult
useful	something new	detrimental

Something else, what? \_\_\_\_\_

5. How satisfied are you with your group's cooperation? Circle your answer.

very satisfied      satisfied      dissatisfied      very dissatisfied

6. What was it like to be in different roles during the game-play? The roles were reader, iPad user and encourager. Circle your answer. You may choose as many suitable options as you want.

interesting	exciting	irritating
fun	quite ok	boring
easy	challenging enough	difficult
useful	something new	detrimental

Something else, what? \_\_\_\_\_

7. How satisfied are you with your own effort during the game-play? Circle your answer.

very satisfied      satisfied      dissatisfied      very dissatisfied

8. What kind of opportunities did the game offer for practicing English and Swedish? There are statements below. Circle your answer in accordance with whether you agree (☺) or disagree (☹).

- |   |   |   |
|---|---|---|
| a) There were versatile opportunities for practicing English. | ☺ | ☹ |
| b) There were versatile opportunities for practicing Swedish. | ☺ | ☹ |
| c) I learned new words in English.                            | ☺ | ☹ |
| d) I learned new words in Swedish.                            | ☺ | ☹ |
| e) I became more confident in using English.                  | ☺ | ☹ |
| f) I became more confident in using Swedish.                  | ☺ | ☹ |

9. How satisfied are you with your group's productions in English and Swedish in the game (videos, texts, audios)? Circle your answer.

a) English:

very satisfied      satisfied      dissatisfied      very dissatisfied

b) Swedish:

very satisfied      satisfied      dissatisfied      very dissatisfied

10. What do you think about including both English and Swedish in the game? Circle your answer. You may choose as many suitable options as you want.

interesting	exciting	irritating
fun	quite ok	boring
easy	challenging enough	difficult
useful	something new	detrimental

Something else, what? \_\_\_\_\_

11. Would you like to play a similar game again as part of your English and Swedish studies? Circle your answer.

yes                      no

## Appendix IV: Interview script (original in Finnish, translation in English)

### Aiempi pelitausta

1. Millainen teidän aiempi pelitaustanne on, oletteko pelanneet paljon video- tai mobiilipelejä?
  - Millä kielellä? (suomi, ruotsi, englanti)
2. Pelaatteko yleensä yksin vai kavereiden kanssa?
3. Oletteko aiemmin käyttäneet vieraiden kielten oppimiseen tarkoitettuja sovelluksia?
  - Osana kouluopetusta tunneilla tai kotona? Vapaaehtoisesti?
  - Esim. Quizlet, Duolingo, Kahoot.

### Pelaaminen

1. Mitä mieltä olette pelistä? (kyselyn vastaus 1)
  - Perusteluja/esimerkkejä.
  - Yhteen vetoa, ovatko ryhmän jäsenet samaa mieltä vai eivät?
2. Mitkä olivat pelin hyviä ja huonoja puolia?
4. Mikä oli kivointa pelatessa? (kyselyn vastaus 2)
  - Perusteluja.
5. Mikä oli hankalaa pelatessa? (kyselyn vastaus 3)
  - Perusteluja, kuinka selvisitte hankaluuksista?

### Ryhmän yhteistyö pelitilanteessa

1. Miltä pelaaminen ryhmässä tuntui? (kyselyn vastaus 4) Kertokaa joitakin esimerkkejä.
  - Yhteen vetoa.
  - Esimerkkejä tilanteista, joissa yhteistyöstä oli selkeästi hyötyä pelaamisen aikana.
  - Esimerkkejä tilanteista, joissa mahdollinen yhteistyön puute johti ongelmiin.
2. Ennen pelaamisen aloittamista päätitte ryhmällemme nimen, otitte ryhmällemme kuvan, sekä teitte yhteistyöharjoituksen. Miten tämä mielestänne vaikutti ryhmän toimintaan?
  - Millaisia ristiriitatilanteita pelatessa syntyi ja miten ratkaisitte ne?
  - Oliko kaikilla ryhmäläisillä tilaa osallistua? Vai joutuivatko jotkut taka-alalle, kun toiset olivat jatkuvasti äänessä?
  - Näistä puhuttiin yhteistyöharjoituksessa, käytittekö keksimiänne strategioita?
3. Pelissä teidän tuli tehdä yhteisiä päätöksiä ryhmänä. Miten toimitte?
  - Esim. Kuinka joku juttu sanotaan englanniksi tai ruotsiksi? Mitä tehdään tai minne mennään seuraavaksi?
4. Kuinka tyytyväisiä olette ryhmän yhteistyöhön? (kyselyn vastaus 5) Yhteen vetoa. Miksi?
5. Kuinka yhteistyötä voisi parantaa ensi kerralla?

- Mitä kannattaisi tehdä eri tavalla?

### **Roolit**

1. Millaista oli toimia eri rooleissa pelin aikana? (kyselyn vastaus 6)
2. Vaihtelivatko kokemuksenne roolista riippuen?
  - Roolit: ääneen lukija / ajankäytöstä huolehtija, iPadin käyttäjä, rohkaisija.

### **Oma työskentely**

1. Kuinka tyytyväisiä olette omaan työskentelyynne pelin aikana? (kyselyn vastaus 7)  
Miksi?
2. Mitä tekisitte toisin seuraavalla kerralla, jotta voisitte parantaa omaa työskentelyänne?

### **Englannin ja ruotsin vertailu**

1. Mitä voi oppia pelaamalla tällaista peliä? Pääsittekö harjoittamaan kielitaitoanne? (kyselyn vastaus 8)
  - Monipuoliset mahdollisuudet harjoitella kieliä?
  - Kuinka opitte uusia sanoja? Kontekstista eli asiayhteydestä? Ryhmän muiden jäsenten avulla?
  - Lisääntynyt rohkeus: Uskallatteko käyttää enkkua ja ruotsia helpommin nyt pelin pelaamisen jälkeen? Oletteko itsevarmempia kielenkäyttäjiä?
2. Millaista oli käyttää englantia pelissä? Entä millaista oli käyttää ruotsia pelissä?
  - Millaisia ongelmia teille tuli enkussa ja ruotsissa pelin aikana? Kuinka selvisitte niistä? Esim. ei ymmärrä ohjeita, joten hankalaa tietää mitä tehdä seuraavaksi.
3. Millaista oli käyttää englantia ja ruotsia rinnakkain pelin aikana? (kyselyn vastaus 10)
  - Yhteenvedoa. Perusteluja. Miksi?
4. Kuinka kielen vaihtuminen pelissä vaikutti ryhmän toimintaan?
  - Oliko ryhmän toiminta erilaista, kun piti käyttää englantia tai ruotsia?
5. Kuinka tyytyväisiä olette ryhmänne englannin- ja ruotsinkielisiin tuotoksiin pelissä (videot, tekstit, äänitiedostot)? (kyselyn vastaus 9)
  - Tuntuuko siltä, että teitte parhaanne? Jäikö jokin kohta mietityttämään?

### **Vieraiden kielten oppitunnit**

1. Mitä mieltä olette tällaisesta opiskelutavasta kielten tunneilla? Haluaisitteko jatkossakin pelata vastaavaa peliä? (kyselyn vastaus 11)
  - Enkun ja ruotsin opet katsovat teidän pelituotokset jälkikäteen, ja oppilaille on mahdollisuus antaa lisänäyttöä kielitaidosta ja vaikuttaa arvosanaan positiivisesti.
  - Olisi mahdollista jatkaa näiden parissa työskentelyä tunneilla esim. palautteen muodossa.
2. Oletteko aiemmin opiskelleet koulussa kahta eri kieltä samalla tunnilla?

- Esim. osana monialaisia projekteja, joissa on mukana useita eri oppiaineita.
3. Mitä mieltä olette siitä, että koulussa olisikin yhteinen vieraan kielen tunti eikä erikseen englantia ja ruotsia?
    - Samalla tunnilla voitaisiin oppia useita eri kieliä, eikä aina yhtä kieltä kerrallaan.

## **Lopuksi**

Haluaisitteko vielä lopuksi sanoa jotain?

Kiitos!

## **Previous gaming experience**

1. What's your gaming background like, have you played a lot of video or mobile games?
  - In which language? (Finnish, Swedish, English)
2. Do you usually play alone or with friends?
3. Have you previously used foreign language learning apps?
  - As part of your school work on lessons or at home? Voluntarily?
  - E.g. Quizlet, Duolingo, Kahoot.

## **The game-play**

1. What do you think about the game? (questionnaire answer 1)
  - Arguments/examples.
  - Summary, do the group members agree with each other?
2. What were some of the pros and cons of the game?
3. What was the nicest thing about playing the game? (questionnaire answer 2)
  - Arguments.
6. What was difficult when playing the game? (questionnaire answer 3)
  - Arguments, how did you overcome hardships?

## **Group-internal cooperation in the game-play**

1. How was it to play as a group? (questionnaire answer 4) Tell some examples.
  - Summary.
  - Examples of situations where cooperation was clearly beneficial in the game-play.
  - Examples of situations where possible lack of cooperation led to problems.
2. Prior to the start of the game-play you decided on a group name, took a group picture, and did a cooperative exercise. In your opinion, how did this affect your group work?

- What kind of conflict situations did you have in the game-play and how did you manage them?
  - Did all group members have enough room to participate? Or were some students left in the background while others were more vocal?
  - These were talked about in the cooperative exercise, did you use any of the strategies that you had come up with?
3. In the game you needed to make decisions as a group. How did you do it?
    - E.g. How to say something in English or Swedish? What to do or where to go next?
  4. How satisfied are you with the group's cooperation? (questionnaire answer 5) Summary. Why?
  7. How could the cooperation be improved in the future?
    - What could be done differently?

### **Roles**

1. What was it like to be in different roles during the game-play? (questionnaire answer 6)
2. Was your experience different depending on the role?
  - Roles: reader / time keeper, iPad user, encourager.

### **Own effort**

1. How satisfied are you with your own effort during the game-play? (questionnaire answer 7) Why?
2. What would you do differently in the future in order to improve your own effort in the game-play?

### **Comparing English and Swedish**

1. What can you learn by playing a game like this? Did you have a chance to practice your language skills? (questionnaire answer 8)
  - Versatile opportunities for practicing languages.
  - How did you learn new words? From the context? With the help of group members?
  - Increased encouragement: Do you have more courage to use English and Swedish now after playing the game? Are you more confident language users?
2. What was it like to use English in the game? How about Swedish?
  - What kind of problems did you have in English and Swedish during the game-play? How did you cope with them? E.g. not understanding instructions, difficult to know what to do next.

3. What was it like to use English and Swedish in parallel during the game?  
(questionnaire answer 10)
  - Summary. Arguments. Why?
4. How did the change of the target language in the game affect your group?
  - Did your group function differently when using English respective Swedish?
5. How satisfied are you with your group's productions in English and Swedish in the game (videos, texts, audios)? (questionnaire answer 9)

### **Foreign language lessons**

1. What do you think about this method of studying on language lessons? Would you like to play a similar game in the future? (questionnaire answer 11)
  - Teachers of English and Swedish are going to watch your game productions afterwards, and the students have an opportunity to give additional, positive evidence of their language proficiency for evaluation purposes.
  - It would be possible to continue working on these in class e.g. in the form of feedback.
2. Have you previously studied two different languages on the same lesson?
  - E.g. as part of multidisciplinary learning projects that involve multiple subjects.
3. What's your opinion on having a joint foreign language lesson in school instead of studying English and Swedish separately?
  - You could study multiple languages on the same lesson, not just one language at a time.

### **Concluding remarks**

Would you like to add something before we finish the interview?

Thank you!

## **Appendix V: Coding frame**

### **PREVIOUS GAMING EXPERIENCE**

#### **previous mobile game experience**

- no
- yes
- some experience (not really recently)

#### **language used in gaming**

- Finnish
- English
- Swedish
- Russian

#### **companionship in gaming**

- alone
- together with someone
- both

#### **gaming environment**

- at school, as part of teaching
- at home, voluntarily
- both

#### **mobile games**

- Quizlet
- Kahoot

#### **previous experience of studying multiple languages simultaneously**

- yes
- no

## THE GAME-PLAY OF *SCHOOL DETECTIVES*

### **opinion of the *School Detectives* game**

- positive
- negative
- neutral
- miscellaneous/other

### **reasons why *School Detectives* was perceived positively**

- interesting
  - it was better than Quizlet
- fun
  - fun to solve problems
- easy
  - when you understand the logic
  - English was easy
  - quests made playing easier
- useful
  - learning languages better
    - learning new words
    - seeing how well one understands the foreign language
    - practicing oral skills (shooting videos)
  - social skills
- challenging enough
  - succeeding after thinking really hard
- solving the mystery/tasks
  - tasks/quests in general
  - unlocking the padlock
  - encouragement upon finishing the task/mystery
  - success: the main point with quests was to finally succeed even though there were problems on the way
- group work
  - good group
  - getting help from group members

- miscellaneous
  - physically moving to different places
  - liking English
  - "no cons"
  - making mistakes
  - the playing itself

### **reasons why *School Detectives* was perceived negatively**

- irritating
  - "fake" end of the game
  - Swedish-speaking Håkan character in the game
- boring
  - the appearance of the game was a bit boring in terms of "lacking color"
- difficult
  - Swedish was difficult
    - understanding task instructions in the game in Swedish
    - not being good at Swedish
    - not as proficient in Swedish as in English
    - having studied Swedish for a shorter time than English
  - speaking in English and Swedish was difficult
    - shooting a video
    - pronunciation
  - difficulties in understanding the tasks/quests
    - the padlock task
  - technical difficulties in the use of iPad
- complicated and confusing
  - missing the common thread
    - reading, talking, acting were confusing "didn't know what to act/say"
  - sometimes difficult to know where to go in the game or to find a task
- language-related critique
  - disliking Swedish
  - wishing there was more English in the game
  - not including more languages that the participants know, e.g. Russian

**reasons why *School Detectives* was perceived neutrally**

- quite ok
  - o quests/tasks in the game, neither positive nor negative opinion

**reasons why *School Detectives* was perceived in some other way**

- something new
- exciting
  - o wearing GoPros

**GROUP-INTERNAL COOPERATION****opinion of the cooperative group experience in general during the game-play**

- positive
- negative
- neutral
- miscellaneous/other

**reasons why the cooperative group experience was perceived positively**

- interesting
- fun
  - o fun to play in a different group than usually
  - o fun because of our good group
- useful
  - o learning social / group work skills
    - lack of cooperation (not asking everyone's opinion) might lead the group not to succeed in the game
  - o learning languages/words
  - o completing the quests in cooperation
    - helping each other to understand the contents in a foreign language
- challenging enough

**reasons why the cooperative group experience was perceived negatively**

- boring
  - o male-dominant mix of participants

- difficult
  - wanting to do some parts quickly on one's own
  - not wanting to let group members do their share

**reasons why the cooperative group experience was perceived neutrally**

- quite ok

**reasons why the cooperative group experience was perceived in some other way**

- something new
  - we usually don't change roles
  - we usually decide on the roles ourselves
- exciting

**the effects of the cooperative exercise prior to the game-play on the group-internal cooperation**

- positive
- negative
- neutral

**reasons why the cooperative exercise had positive effects on the group-internal cooperation**

- taking others better into consideration
- everyone participated
- leaving off-topic things out
- helped a little (unspecified)
- heightening the group spirit, but not a big effect, easy group
- using the strategies brought up in the exercise during game-play

**reasons why the cooperative exercise had neutral effects on the group-internal cooperation**

- no effect because we already know each other so well and are used to working as a group

**conflict situations during the game-play**

- yes
- no

**examples of conflict situations during the game-play**

- minor disagreements
  - o e.g. what to do next on the iPad

**decision-making strategies as a group**

- joint conversation
- following the one who has a hunch or who knows that to do
- both

**satisfaction with the cooperation within the group**

- very satisfied
- satisfied
- dissatisfied
- very dissatisfied

**satisfying aspects of cooperation within the group**

- smooth cooperation
- no conflicts

**dissatisfying aspects of cooperation with the group**

- the lack of another girl in the group (female opinion)
- frustration because you are used to doing everything quicker on your own
- sometimes no-one understood or knew what to do

**enough room to participate in cooperation**

- yes
- no

**reasons why there was enough room to participate in cooperation**

- everyone participated in their own way
- no-one was left aside
  - o making sure everyone had had time to read instructions
- not everyone wanted to fully participate
  - o you can't force anyone to participate if they don't want to be in a video
- nice to have a conversation in our easy group

**improvement suggestions for the future**

- giving more space to others to participate
- having another girl in the group
- no suggestions
- no blackouts for the whole group (in terms of how to say X in a foreign language)

*ROLES (subtheme under cooperation)***opinion of using the roles in the game**

- positive
- negative
- neutral
- miscellaneous/other

**reasons why roles were perceived positively**

- interesting
  - o changing the roles
- fun
- easy
- useful
  - o changing the roles
    - doing and learning new things
    - doing everything in cooperation
  - o versatile (monipuolista)
    - it would have been too monotonous if always having the same role

**reasons why roles were perceived negatively**

- difficult
  - not easy to stay in one's role and let others use the iPad
  - using the iPad (iPad user) was difficult
  - not knowing how to pronounce a word (reader) caused difficulties

**reasons why roles were perceived neutrally**

- quite ok
- not having to inform others in the role of time keeper
  - keeping track of time on one's own, not talking about it in the group
  - starting to crucially check time upon the fire drill
- not having to behave differently in the role of encourager
  - because there was no need for more encouragement in the group
  - just being yourself, encouragement and positivity come naturally
- nothing special

**reasons why roles were perceived in some other ways**

- something new
- exciting
  - it's almost my turn for the next role

**staying in the given roles**

- well
- to some extent
- poorly

**reasons for not always staying in one's role**

- not wanting to do the duties related to the role
- not having patience to wait that someone else does X
- helping others in their roles
- getting excited

*OWN EFFORT (subtheme under cooperation)***satisfaction with own effort in the game-play**

- very satisfied
- satisfied
- dissatisfied
- very dissatisfied

**satisfying aspects of one's own effort in the game-play**

- satisfied with own effort / participation
- doing one's best

**dissatisfying aspects of one's own effort in the game-play**

- lack of motivation momentarily
  - e.g. due to lack of the common thread in the game
- might have sounded angrier than one really was

**improvement suggestions for the future**

- reading instructions more carefully
- staying better in my role
- trying to participate more
  - answering and doing things
  - speaking the target language
  - maybe trying to participate more
- practicing the target languages more in order to do better in the game-play

## COMPARISON OF ENGLISH AND SWEDISH

**versatile opportunities for practicing English**

- agree
- disagree to some extent
- disagree

**reasons why there were versatile opportunities for practicing English**

- speaking
- writing
- deducting/infering
- reading
- listening
- as opposed to just writing on the course book / writing grammar on the notebook
- authentic language use
- new as well as known words
- lots of English in the game
  - o different conversations (not specified whether digital/IRL)

**reasons why there were not versatile opportunities for practicing English**

- more writing would be nice

**versatile opportunities for practicing Swedish**

- agree
- disagree
- agree to some extent
- neither disagreement nor agreement

**reasons why there were versatile opportunities for practicing Swedish**

- speaking
- writing
- reading
- listening
- as opposed to just writing on the course book / writing grammar on the notebook
- authentic language use

**reasons why there were somewhat versatile opportunities for practicing Swedish**

- too much reading → monotonous
- the Swedish-speaking character Håkan was not interesting at all

### **reasons for neither agreement nor disagreement regarding versatile opportunities for practicing Swedish**

- too much reading → monotonous
- the in-game character Håkan didn't have a personality, too much of him in the game

### **learning new words in English**

- agree
- disagree

### **techniques for learning new words in English during the game-play**

- inferring from context
- getting help from a group member in cooperation
- both

### **learning new words in Swedish**

- agree
- disagree
- agree to some extent

### **techniques for learning new words in Swedish during the game-play**

- inferring from context
- getting help from a group member in cooperation
- both

### **techniques for learning new words in cooperation with others**

- asking one another what X (in a foreign language) means
- asking what X is in the target language (X in Finnish)
- the one who knows translates into Finnish
- trying to translate into Finnish together
  - putting real effort into thinking about the meanings of difficult words in cooperation
- advising how to spell a word

**outcome of word learning**

- correct
- incorrect

**becoming more confident in using English**

- agree
- agree to some extent
- disagree
- neither disagreement nor agreement

**becoming more confident in using Swedish**

- agree
- disagree
- agree to some extent

**language preference in the game**

- English
- Swedish
- both
- unknown opinion

**reasons why English was liked**

- fun/nice
- not boring
- quite ok
- not too difficult

**reasons why Swedish was liked**

- quite fun
- suitable difficulty level

**reasons why Swedish was not liked**

- disliking the in-game character Håkan

- disliking the language
- difficult
  - having studied Swedish for a shorter time than English
  - preference for English because Swedish is so much more difficult that it reduces the enjoyment of gaming

### **reasons why Swedish was not preferred/liked much but was still oriented to positively**

- even though Swedish was more challenging, it was still viewed positively in general:
  - slightly positive mediocre opinion, not negative
  - quite fun but difficult
  - the game improved Swedish skills more than English skills

### **how change of language affected the group's functioning**

- no effect
- effect
  - knowing things better as a group in English as opposed to Swedish
  - helping each other more with words in Swedish

### **satisfaction with the in-game products in English**

- very satisfied
- satisfied
- dissatisfied
- very dissatisfied

### **satisfying aspects of the in-game products in English**

- the required English content was easier, as it has been practiced enough

### **dissatisfying aspects of the in-game products in English**

- more lively pronunciation in the last quest
- word order, places of prepositions

### **satisfaction with the in-game products in Swedish**

- very satisfied
- satisfied

- dissatisfied
- very dissatisfied

### **satisfying aspects of the in-game products in Swedish**

- with respect to our skill levels

### **dissatisfying aspects of the in-game products in Swedish**

- speaking Swedish doesn't come naturally
- more difficult than English

## **TWO TARGET LANGUAGES**

### **opinion of including English and Swedish simultaneously in the game**

- positive
- negative
- neutral
- miscellaneous/other

### **reasons why the simultaneous presence of English and Swedish in the game was perceived positively**

- interesting
- fun
- useful
  - learning both languages simultaneously
- challenging enough
- variation and versatility
  - not having to use one language all the time
- having 2 target languages simultaneously was not a bad thing per se

### **reasons why the simultaneous presence of English and Swedish in the game was perceived negatively**

- difficult
  - Swedish
  - no common thread in terms of when the language changes

- detrimental
  - no common thread in terms of when the language changes
- confusing
  - there was no common thread in the game
  - confusing English with Swedish
  - better if it was clearer when to use English and Swedish
    - need to take a break in between, e.g. the first half of the game in language X and the second half in language Y” (as opposed to only having 1 language in the game)
- wanting only English in the game

**reasons why the simultaneous presence of English and Swedish in the game was perceived neutrally**

- quite ok

**reasons why the simultaneous presence of English and Swedish in the game was perceived in some other way**

- something new
  - no prior experience of speaking English and Swedish in parallel
- exciting
  - not sure which language will be used next in the game (is the language going to change or not)

**FOREIGN LANGUAGE CLASSES**

**willingness to play a similar game in the future**

- yes
- no

**reasons why to continue playing games like this**

- fun (as compared to usual lessons)
- people learn in different ways (different learning styles)
  - listening and doing instead of sitting down and being quiet for the whole lesson

- learning style of listening and reading possible in the game
- more relaxing way of learning
- liking the game as a whole
- brings more variety to lessons, not to substitute all teaching

**reasons why not to continue playing games like this**

- playing games is not the best learning style
- playing a game does not really count as learning

**opinion of having a joint language lesson instead of studying English and Swedish separately**

- positive
- negative
- neutral

**reasons why having a joint language lesson instead of studying English and Swedish separately was viewed positively**

- more challenging but interesting
- fun/nice
- ok idea as part of multidisciplinary learning modules
- useful
  - learning both languages simultaneously
  - more variation (not studying one and same thing for the whole lesson)

**reasons why having a joint language lesson instead of studying English and Swedish separately was viewed negatively**

- it would be distressing
- confusing
- can't enjoy the preferred language if also the disliked language is included

**reasons why having a joint language lesson instead of studying English and Swedish separately was viewed neutrally**

- maybe ok

## Appendix VI: Quotes

### Example 1

“Se päiväkirjajuttu missä piti ottaa ne numerot siitä sillei jännästi.”  
(Isabella, Group 1)

### Example 2

”Se ehkä niinku tavallaan niinku opetti si-, opettaa niinku sosiaaliseen elämään vähän niinku valmistautuu ja sitte ehkä niinku just niinku toisten kautta tuli niitä uusia sanoja ja tällästä.”  
(Noel, Group 1)

### Example 3

”Mut sitten niinku nyt ku vaiheltiin niitä ni sit kaikki teki vähänniiku, vähänniiku yhteistyöllä kaiken.”  
(Kalle, Group 3)

### Example 4

“Mun mielest ei siinä oo mitään vikaa et siin on poikii. Mut mä oon vaan tosi hämmentyny jos mun ryhmässä on pelkästään poikia. Koska mä oon tottunu semmosein niinku, missä on vähintään yks tyttö mukana.”  
(Isabella, Group 1)

### Example 5

”No ei me oikeen jaeta missään ryhmätöissä mitään rooleja. Että niinku, se menee vaan niinku luonnostaan sillee et joku on se aina.”  
(Aino, Group 2)

### Example 6

“Ainaski mä otin ehkä paremmin huomioon nää, koska mä oon yleensä normaalisti ryhmätöissä silleilä et mä haluan tehdä just niinku jotain, ja sit jotkut on silleilä et ne ei halua osallistua. Ni tässä kaikki, kaikki osallistu just [...] Ja me jätettiin sellanen turha niinku.”  
(Noel, Group 1)

### Example 7

”Mulla on Espanjasta taas yks sellanen, joskus oli tunnilla et me saatiin niinku sieltä sellanen ns. kirjekaveri, mut vaan niinku sähköpostin kautta. Ni mä ku juttelin sille englantii ni sitä

pysty sit käyttää mitä mä käytän sen kanssa, koska mä en pysty tunnilla käyttämään niitä oikeestaan ollenkaan.”  
(Isabella, Group 1)

### Example 8

”Kirjotetaaks me ruotsiks tää vai englanniks? Koska eihä se Häkar [Håkan] osannu englantia.”  
(Noel, Group 1)

### Example 9

Aino: ”Mikä on padlock?”  
Olivia: ”Toi lukko (osoittaa lukkoa). Veikkaisin.”  
(Group 2)

### Example 10

”Onhan ne kuullu, mut ne ei oo jääny mieleen. Mut nyt ne ainaski jäi mieleen. Ja sit oppi just sitä ryhmätyötä että kehittyy siinä sosiaalisetkin taidot.”  
(Noel, Group 1)

### Example 11

Kalle: ”Mikä on niinku piirtää? Skriva?”  
Roosa: ”Eiku se on kirjoittaa.”  
Maisa: ”Se oli se”  
Roosa: ”Emily”  
Kalle: ”Joku malade [målade]. Ei se oli se”  
Roosa: ”Se on maalata”  
Maisa: ”Tää löytys just siitä ruotsin kirjasta mut mä en muista”  
Roosa: ”Mm niimpä. Nojoo sitte”  
Maisa: ”Tecknade eiks se ollu, tecknade? Teckna”  
Kalle: ”Tecknade on mun mielestä kirjottaa.”  
Roosa: ”Ei oo ku skriva.”  
Maisa: ”Se on skriva.”  
Roosa: ”Skriva on kirjoittaa.”  
Kalle: ”No kai me sit laitetaan se.”  
(Group 3)

### Example 12

Noel: ”Kirjota sinne jag hobbyer är... Mikäköhän on käsi?”  
Isabella: ”Hand on käsi.”  
Noel: ”Umm... käsityö... handjobba. Oisko?”

Isabella: ”Aina voi kokeilla.”  
(Group 1)

### **Example 13**

“Tavallaan se oli vähän tylsää et siin oli se ruotsi ku tykkään enemmän enkusta, mutta toisaalta se oli hyvä siinä sit oppi niitä ruotsinki sanoja tiettyjä.”  
(Noel, Group 1)

### **Example 14**

“Kun siin ei periaatteessa ollu sitä punasta lankaa, ni se oli vähä haitallista et ne molemmat kielet tuli siihen samaan aikaan, mikä teki siit sit sekalaisen.”  
(Isabella, Group 1)

### **Example 15**

“No mu- siis mul, mullei ainakaan niinku parhaiten opi tolla tavalla mut sit jollekki muulle se ois kivempaa ja vähä niinku helpompaa sillei ettei tarviis aina kirjottaa tunneilla.”  
(Aino, Group 2)

### **Example 16**

“Tää on ehkä sillei kiva pieni vapautus ja et sä samal opit sitä, mut ei sit niinku oppimiseen.”  
(Isabella, Group 1)

### **Example 17**

“Jos ei tykkää nii paljo siitä ruotsin kielestä, ni nauttii sit niistä enkun tunneista. Ois kiva pitää ne niinku omana tuntina.”  
(Aino, Group 2)