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Evaluating Mobile-Based Educational Adventure Games for Language Learning

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Evaluating Mobile-Based Educational Adventure Games for Language Learning

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Abstract

Despite there being many gamified apps, such as vocabulary trainers, on the market for language learning, there are not many that use communicative and task-based methods for instruction (e.g. adventure games). Well-designed games are intrinsically motivating to play even if they are long and challenging, and as Gee (2007) pointed out, facilitate learning. The Goethe Institute, a German language and culture institute, has tapped into the allure of adventure gaming and combined it with the benefits of communicative language learning. This study examines the strategies of these mobile-based adventure games for learning German and evaluates the principles of game design, language learning and technical criteria they implement to provide a model for the future development of mobile-based adventure games for language learning, particularly learning English. Unlike German, English is a global language so there are several other considerations that need to be made for developing such a game for English.

Introduction

Technology is changing constantly and providing humanity with new ways of living and learning. Language learning has not been untouched by these changes. Advances in speech recognition and machine translation have allowed people to communicate without knowing a word of another language. The Internet connects people from all over the world and provides them with access to content, texts, videos, music and many other resources in other languages. There are countless apps available to download that help teach vocabulary, grammar or even claim to make a user fluent. Many of these apps are gamified and let the user score points or earn badges. While this provides a nice incentive and passes the time, these apps are based on a

skill and drill technique, in which repetition and memorization are key (Dondlinger, 2007). Decision-making, communicative activities, cultural sensitivity and higher order thinking, all of which are important for language acquisition, are not necessary to use these apps (Chen & Yang, 2013).

An option that eliminates the challenges related to most apps and programs currently available and that creates an element of communicative language learning is to create mobile-based educational adventure games for language learning (Borges, 2014). Dondlinger (2007) distinguishes *skill and drill* apps from more interactive apps with the terms *edutainment games* and *educational games*. She further specifies a sub-category of educational games as *adventure game.* An adventure game is distinct from other games in that gameplay is directed by a narrative plot and users must strategize and problem-solve to reach the end of the game (Dondlinger, 2007; Grace, 2005). Research done with English learners around the world has demonstrated positive learning outcome and students have been receptive towards using mainstream video games to learn their target language. However, none of the games in these studies were designed with language learners in mind and many students complained that the language was too fast, and they could not play it back or read it.

Although it seems natural to incorporate language learning into mobile-based educational adventure games, very few of this kind exist, especially for learning English as a second/foreign language (henceforth ESL/EFL, see Longcope (2009) for more), However, for learning German there are currently two adventure games that have been developed for teens and adults that can be downloaded for free from the Play Store and the Apple Store. They were created by the Goethe Institute, a German language and culture institute with branches all over the world (Goethe Institute, n.d.). These games are leveled at the A2 and B1 Common European

Framework of Reference (CEFR) levels which are roughly equivalent to ACTFL receptive skills of intermediate mid to advanced low (see “The CEFR Levels”, n.d. and “Assigning CEFR Ratings to ACTFL”, n.d. for a description of the levels). These games allow players to visit various locations in German cities and complete various virtual tasks that they may encounter during a real stay in Germany.

My thesis will evaluate the two games for learning German mentioned above in terms of game design, language learning and technical principles. Based on this evaluation, I will make recommendations for designing a game of this type for learners of English. An important element of my recommendations will be considerations of English not only as a second or foreign language but as an international language (EIL). Creating an adventure game for EIL purposes would require different elements than an adventure game for learning German because “the teaching and learning of an international language must be based on an entirely different set of assumptions than the teaching and learning of any other second or foreign language” (McKay, 2002, p. 1).

Literature Review/Background

General Learning via Games

The appeal of using games for general learning is well known and recognized for being highly motivating. Prensky (2001) has explained how the current generation of people entering the work force will not tolerate traditional learning which they consider boring. Digital game-based learning will likely become ubiquitous in both schools and the workplace in the next decades (Prensky, 2001). One reason games have gained attention is that players are intrinsically motivated to play them, despite potential challenges and setbacks the encounter during the game.

To help explain this, Malone (1980) suggested that challenge, fantasy and curiosity are the three elements that make a computer game intrinsically motivating. Challenges are created by designing obvious goals that the player must reach. Players are interested in meeting these goals because they are part of a larger narrative framework that makes them more compelling (Dickey, 2006). The element of fantasy allows players to explore an imaginary world or augment the real world just enough to make it interesting and novel. Either way, fantasy lets players do things they could not do (or currently are not able to do) which gives them a strong feeling of freedom and autonomy. The final element that Malone links to motivation is curiosity. This element makes a game exciting. Players can experiment with virtual environments to see how their avatar interacts with different objects. Malone (1980) says these environments "should be novel and surprising but not completely incomprehensible" (p. 165).

As more games and ways to play them have been developed, game designers have discovered many valuable and effective methods for getting people to learn their games rapidly through play, without having to read a complicated rule book (Gee, 2005). James Paul Gee has written numerous articles and a book *What Video Games Have to Teach us About Learning and Literacy* that outline the techniques that good video games implement to allow players to learn and remember complex controls, systems and information and enjoy doing it. He outlines 36 learning principles that good games rely on to accomplish this.

However, not all games made for learning are equal. Dondlinger (2006) makes a valid distinction between *edutainment* and educational games. She concludes that edutainment relies on skill and drill tactics and function more like digital textbook activities that make players "practice repetitive skills or rehearse memorized facts" (Dondlinger, 2006, p.22). The edutainment market was highly criticized for this in the early 2000's and this type of game saw a

large fall in popularity. Dondlinger provides an excellent definition of educational games that distinguish them from other types:

> educational video games require strategizing, hypothesis testing or problem solving, usually with higher order thinking rather than rote memorization or simple comprehension. Characteristics of such games include a system of rewards and goals which motivate players, a *narrative context* which situates activity and establishes rules of engagement, learning context that is relevant to the narrative plot and interactive cues that prompt learning and *provide feedback* (p.22, emphasis added).

Language Learning via Games

Currently, there are many ways to learn a language with software or apps but many of them clearly fall into the *edutainment* category. This section will primarily focus on language learning through educational games that are of the adventure or simulation type. Adventure games are games in which the player is usually the protagonist set in a narrative and play requires solving puzzles and exploring. The purpose of a simulation game is to simulate events or social situations in the real world such as building and operating an amusement park or city.

Reinhardt and Sykes (2012) make another distinction between language learning that is "game enhanced" versus "game-based" and the advantages and disadvantages of both. Game-enhanced language learning is using non-educational commercial video games in the target language for instructional purposes. Teachers could supplement different sections of the game with worksheets or quizzes, for example. There are several studies in university EFL and ESL contexts (Iran, Taiwan, Malaysia, USA) that showed students were able to improve listening and reading comprehension as well as vocabulary using commercial video games with such activities (Azar & Nasiri, 2014; Chen & Yang, 2013; Ranalli, 2017). Several of these studies also showed that students felt their skills had improved and that they were very receptive to using games in

the classroom (Azar & Nasiri, 2014; Chen & Yang, 2013; Liu & Chen, 2015; Soleimani, Ismail, & Mustaffa, 2014).

While there are some advantages to using game-enhanced methods, i.e. exposure to authentic language/culture and potentially problem solving with other players using the second language (L2), there are several issues with using non-educational commercial games. First, using these games for the classroom can be very expensive or inappropriate and learners have expressed concerns that the dialogues are spoken too fast to understand and that textboxes that display the characters' conversations disappear too fast (Chen & Yang, 2017). Additionally, the language used in mainstream video games may be too complex or use very low frequency or archaic vocabulary that would be unsuitable or inaccessible to all but a few more advanced learners (Reinhardt & Sykes, 2012). Ranalli (2008) also notes that it is very hard to predict what vocabulary students will be exposed to during play, especially in simulation or role-playing games, making it harder to develop materials or have discussions in class. Often these games, though spoken in the target language, do not help students develop other competencies related to language learning such as pragmatic practice, sociolinguistic exposure or cultural awareness because they are set in fantasy worlds.

Game-based L2 learning is using games that have been designed with language learning principles and theories in mind (Reinhardt & Sykes, 2012). There are significantly fewer games like this on the market and most of the commercially produced games are for small children. Ranalli (2008) notes that the educational sector would be hard pressed to develop a game as advanced as *The Sims* (mainstream real-life simulation game used in his study to teach vocabulary) because of time, financial and expertise limitations. Hirumi and Stapleton (2008) showed the necessity of close collaboration between game developers and educators to create

quality games for educational purposes. Other adventure games for language learning are often government or university grant projects such as *Mentira* for learning Spanish (mentira.org, University of New Mexico) or a European project titled ISPY aimed at secondary school students for learning a variety of European languages (Rico Garcia & Agudo Garzón, 2016). Currently, other software and apps made for language learning are more of the edutainment variety and lack many elements of language instruction. Game-based language learning, unlike edutainment or game-enhanced learning, can be developed for a specific language level considering the learners' built-in syllabus (Ellis, 2008) and be targeted to specific student demographics and goals. A major benefit of this type of game is that it can be designed to include elements of pragmatic and intercultural competence. As Bachman (1990) makes clear, language is far more than just grammar and words and all parts should be considered in instruction. A major part of learning and using language is understanding sociocultural elements such as sensitivity to register, dialect, cultural references and norms and figures of speech (Bachman, 1990).

Mobile Learning and MALL

Just as the field of language teaching has shifted to a more communicative and task-based method (Brandl, 2008), the apps used for language learning should too. Currently there is a shortage of educational adventure games for language learning but there is significant research suggesting learners would benefit from such a resource. Ranalli (2008) and Chen and Yang (2012) both lamented the lack of games made for language learning and decided to make do with non-educational mainstream computer games for their language learning studies because the cost and time of developing full games is often beyond the reach of most education programs. A solution to this could be to develop shorter mobile apps instead of full length computer software.

A study done by Rico García and Agudo Garzón (2016) showed that secondary students in Spain even prefer playing educational games on their phones or other portable devices over playing on a computer or console. Mobile assisted language learning (MALL) is a growing trend in language learning and an exact definition is still being developed but generally, it includes using mobile devices to learn in any place at any time. It is particularly attractive for its flexibility, options for personalization (Rodríguez-Arancón, Arús, & Calle, 2013) and promotion of learner autonomy (Lyddon, 2016).

Games are widely played and enjoyed by mobile users of all ages and above all other categories an app can be in, *games* is the most popular category in both the Apple Store and Google Play Store ("Apple", 2018, "Google Play", 2017). Despite the benefits of learning via educational adventure games outlined above, most mobile apps for language learning are of the edutainment variety. Martín-Monje, Arús-Hita, Rodríguez-Arancón, & Calle-Martínez (2014) and Kim and Kwon (2012) both conducted similar research projects that evaluated many apps for learning English. Of all the apps both groups of researchers evaluated, neither group was able to find mobile-based educational adventure games for learning English. They only found *edutainment* apps for practicing vocabulary or grammar. Even though educational adventure games for language learning would be welcomed by language learners and help them develop their language skills further, very few are available.

There are, however, a few educational adventure games for learning German that can serve as a model for the future development of educational adventure games for language learning. The Goethe Institute released two free adventure game apps for learning German in 2012 and 2013 that were met with a very positive response. They have since created several other game-based apps for learning about German language and culture.

Considering the limited number of educational adventure games avalible on the market, this exploratory study aims to develop research on this method and seeks to answer these questions:

(1) What digital and pedagogic components and principles of game design make a quality mobile-based educational adventure game for language learning?

(2) How well do the games “The Sky Disc from Nebra” and “A Mysterious Mission” for German language learning follow these principles?

(3) What specific aspects of English’s status as an international language need to be considered for a mobile-based educational adventure game for learning English?

To answer the first question, I will create an evaluation tool based on the literature to rate mobile-based educational adventure games for language learning (existing evaluation tools are currently inadequate for my purposes). For the second question, I will use this evaluation tool to rate the two German games and consider user comments to determine what qualities of these apps make them successful as popular games and as language learning tools. Finally, I will present several factors that need to be considered to create a similar game for ESL/EFL purposes, considering that English is an international, “heterogenous language with multiple grammars, vocabulary, accents, and pragmatic/discourse conventions (Marlina, 2017, p.16). I will not propose a solution to all the questions I present but it is my hope that anyone looking to create such a game will consider the many characteristics of English, its users and the contexts in which it is used during their design process.

Methods

Evaluation Tool

Martín-Monje, Arús-Hita, Rodríguez-Arancón, and Calle-Martínez (2014) and Kim and Kwon (2012) both evaluated dozens of apps for learning English but none of the apps they evaluated were educational games. They were all edutainment apps such as vocabulary trainers, therefore the evaluation tools used in these large studies were not appropriate for the current study (here app and game will be used interchangeably and distinguished by edutainment or educational). For the evaluation of educational game-based language learning apps, I created a rubric divided into three main categories: game design, language learning, and technological criteria. The rubric (Appendix 1) is summarized below in Figure 1. The game design category was adapted from work done by Gee (2007) on game design for learning. The language learning category is related to work done in second language acquisition (SLA) and instruction and is backed up by some of Gee's principles. The technological criteria are adapted from Fernández-Pampillión Cesteros, Domínguez Romero, and Armas Ranero (2012) who created a rubric for the evaluation of mobile language learning apps (not games). Each main category is divided into two to four sub-categories. It is important to note that even though the categories are separated for evaluative purposes, they are closely connected during game play, so if the game lacks in one category the success of the other categories could also be reduced. The rubric is limited to ten total criteria on which to evaluate the game. Though there could be other evaluation criteria, these ten are most relevant to a mobile-based adventure game for language learning. Below I will elaborate on each category and why it was selected.

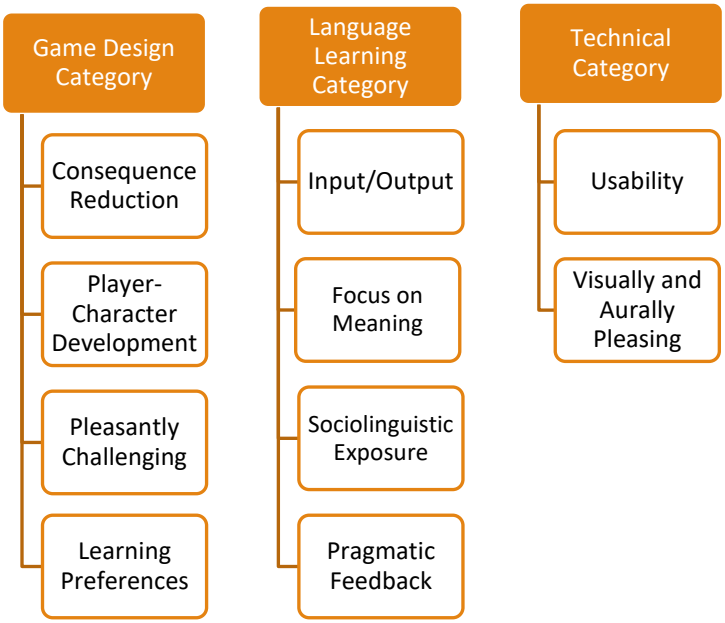

Figure 1. Summary of the Rubric

Game Design Principles

Gee (2007) lists 36 principles of games (Appendix 2) that make them conducive to general learning. I narrowed this list down to four principles that would be most useful to consider for an educational adventure game for language learning. While many of the principles should be considered when designing any type of game, not all the principles need to be included in a rubric to evaluate the genre of educational adventure game. One way I narrowed down the list for the rubric was by combining principles. Some of Gee's principles are closely related such as the "regime of competence" principle, incremental principle and the on-demand and just in time principle. They are similar because each explains the importance of scaffolding challenges and information so that the learner is never under- or overwhelmed. For this reason, all three principles are subsumed by the *pleasantly challenging* category of the rubric. These combinations can be seen in Figure 2 as well as how SLA theory supports each selected principle. Furthermore, some of the principles, while very relevant to general learning, were not

as fit to be listed on a rubric for a language learning game, such as the design principle, which helps users learn about and appreciate design, or the semiotic domains principle which states that learning requires the mastery of semiotic domains (actions, symbols, images, words etc.) and participating in groups related to these domains. Excluded principles can be found in Appendix 2.

Rubric Category	Language Learning principles	Gee's (2007) Principles
Consequence Reduction	Krashen (1985) Affective Filter Hypothesis Brandl (2008) Principle 8: recognize and respect affective factors of learning	**6. "Psychosocial Moratorium" Principle:** Learners can take risks in a space where real-world consequences are lowered (p. 222)
Character Development	Kumaravadivelu (2003) Promoting Learner Autonomy Kumaravadivelu (2003) Activating Intuitive Heuristics	**7. Committed Learning Principle:** Learners participate in an extended engagement (a lot of effort and practice) as an extension of their real-world identities in relation to a virtual identity to which they feel some commitment and a virtual world that they find compelling. (p. 222) **8. Identity Principle**: Learning involves taking on and playing with identities in such a way that the learner has real choices. (p. 222) **9. Self-Knowledge Principle:** The virtual world is constructed in such a way that learners learn not only about the domain but about themselves and their current and potential capacities. (p. 222) **28. Discovery Principle:** Overt telling is kept to a well-thought-out minimum, allowing ample opportunity for the learner to experiment and make discoveries. (p.226)
Pleasantly Challenging	Ellis (2008) Principle 5: Instruction needs to take into account the learner's built-in syllabus. Krashen (1895) Input Hypothesis DeKeyser (2014) Skill Acquisition Theory Lantolf & Thorne (2009) L2 Development: Zone	**11. Achievement Principle:** For learners of all levels of skill there are intrinsic rewards from the beginning, customized to each learner's level, effort, and growing mastery and signaling the learner's ongoing achievements. (p. 226) **12. Practice Principle**: Learners get lots and lots of practice in a context where the practice is not boring. (p. 226) **13. Ongoing Learning Principle:** There are cycles of new learning, automization, undoing automization, and new reorganized automatization. (p. 226) **14. "Regime of Competence" Principle:** The learner gets ample opportunity to operate within, but at the outer edge of, his or her resources, so that at those points things are felt as challenging but not "undoable." (p. 226) **22. Intuitive Knowledge Principle:** Intuitive or tacit knowledge built up in repeated practice and experience. (p. 225) **24. Incremental Principle**: Learning situations are ordered in the early stages so that earlier cases lead to generalizations that are fruitful for later cases. (p. 225)

	of Proximal Development Vygotsky (1978) Zone of Proximal Development and Scaffolding Learning	**27. Explicit Information On-Demand and Just-in-Time Principle**: The learner is given explicit information both on demand and just in time, when the learner needs it or just at the point where the information can be best understood and used in practice. (p. 226) **29. Transfer Principle:** Learners are given ample opportunity to practice, and support for, transferring what they have learned earlier to later problems. (p. 226)
Learning Preferences	Ellis (2008) Principle 9: Instruction needs to take account of individual differences in learners Oxford (2003), Reid (1995) Learning styles and Strategies Kumaravadivelu (2003) Minimizing Perceptual Mismatch	**16. Multiple Routes Principle**: There are multiple ways to make progress or move ahead. This allows learners to make choices, rely on their own strengths and styles of learning and problem solving, while also exploring alternative styles. (p. 223) **20. Multimodal Principle:** Meaning and knowledge are built up through various modalities not just words. (p. 224)

Figure 2. Combination of game design principles and relation to language learning.

The first category of game design is *consequence reduction* which is closely related to the "Psychosocial Moratorium" principle found in Gee (2007). It is also related to the affective filter hypothesis in second language acquisition theory by Stephen Krashen (1985) which posits that learners will not be receptive to input in the second language if they feel anxious, unmotivated, or fear embarrassment. Game environments are mostly void of the consequences and risks we face in the real world. In a game for language learning, the learner may feel less inhibited to "play with the language", make mistakes, accidentally be rude and explore because they are not concerned about losing face in the real world. They can practice using language in "high-risk" situations repeatedly, so that they can hopefully use that language in the real world and be more comfortable using it.

The relationship between the character and player and what that means for language learning is explained by the next category: *character development.* This is mainly related to Gee's (2007) identity principle. In terms of games, a player has an identity that forms and exists

within the game environment and becomes more committed or attached to this identity the more opportunity they have to explore and learn about this virtual word (see Committed Learning Principle above). It is influenced by their identity in the real world and by conditions in the game. In a language learning adventure game, a player may get to develop a character from scratch or assume the role of a pre-designed character. Most importantly the learners can adopt the role of a "competent speaker" of the language, especially if they are making meaningful choices in gameplay and given ample opportunity to make discoveries in the game (see Discovery Principle and others above). This helps them establish and legitimize their identity in the real world and helps them understand their right to be a speaker of their L2.

The third category is *pleasantly challenging* which is presented in Gee (2005) and referred to in Gee (2007) as the "regime of competence" principle. This principle suggests that for optimal gameplay and learning, a game should not be too easy or too hard. Challenges (puzzles, mysteries or language use) are spread out and timed within the game in such a way that players are ready for them and have been directly or indirectly prepared in earlier portions of the game. Players may rely on transfer from previous gaming experience or previous parts of the game they are playing to solve the current puzzle or challenge. In terms of SLA theory, it relates to Krashen's (1985) Input Hypothesis which suggests that language acquisition is supported when language input is one level above the learner's current language level, also known as "i+1". *Pleasantly challenging* is also related to Vygotsky's (1978) *zone of proximal development* and scaffolding which suggest that learners are able to perform more tasks with examples or guidance even if they cannot do a certain task independently and that scaffolding helps break the task down into manageable steps. The *pleasantly challenging* principle is in the game design category of the rubric, and applies to the games storyline and puzzles but it should also be

applied to the language used in the game so that the vocabulary, grammar, length of input etc. become incrementally harder as the game progresses. This is a key consideration when making games for language learners. The language use is part of the challenge of winning the game just the same as any other puzzle or challenge.

The *learning preferences* portion of the rubric relates to Gee's (2007) "multimodal principle" and "multiple routes principle". The "multimodal principle" posits that learning is accomplished best when the player is exposed to knowledge in a variety of modalities such as "images, texts, symbols, interactions, abstract design and sound and not just words" (p. 224). Through this variety of modalities, games make it easier to accommodate the learner's preferred way to absorb and process new information, which is important because each person can have a very distinct learning style based on various factors (Hatami, 2013; Reid, 1987). In SLA theory the presence of various learning styles and strategies in the language classroom is salient. According to Oxford (2013), there are different dimensions of learning styles such as sensory (visual, aural, hands-on), social (introverted, extroverted) as well as cognitive (concrete, abstract, detail oriented, holistic etc.) that games may be able to accommodate better than a traditional classroom. A video game can provide access to a wide variety of input in the target language, instant feedback, images, sound effects and video to stimulate various sensory learning styles and present information in various ways to accommodate different cognitive learning styles. The "multiple routes principle" also allows learners to utilize their learning preferences as it allows them to progress through the game based on their own choices in the game as opposed to being led through the game a single, predetermined story line.

Language Learning Principles

The language learning principles in the rubric have been adapted from Ellis' (2008) principles of instructed second language acquisition, Krashen's (1985) Input Hypothesis, Brandl's (2008) principles of communicative teaching and task-based instruction, Kumaravadivelu's (2008) macrostrategies for language teaching and Bachman's (1990) model of language competence. Ellis listed ten principles based on work done by Krashen, Long, Swain and others for second language classroom instruction (Appendix 3). Each of Ellis' principles is very important and could be used as a checklist for this type of game, but I narrowed this number down to a few that were not already related to the game design principles or by the nature of a mobile game itself. All excluded principles can also be found in Appendix 3. For example, "principle 5: instruction needs to consider the learner's built in syllabus" (Ellis, 2008) is covered above by the *pleasantly challenging* game principle, so it was not included as an individual rubric category. Figure 3 below summarizes which of Ellis' principles or other SLA theories support the language learning rubric category and which of Gee's principles support them.

Language Learning Rubric Category	SLA Theories and Research	Gee's (2007) Principles
Input & Output	Ellis (2008) Principle 6: Successful instructed language learning requires extensive second language input. Ellis (2008) Principle 7: Successful instructed language learning also requires opportunities for output. Brandl (2008) Principle 3: Input needs to be rich Kumaravadivelu (2003) Maximizing Learning Opportunities	**10. Amplification of Input Principle:** For a little input, learners get a lot of output. (p. 222) **18. Text Principle:** Texts are not understood purely verbally but are understood in terms of embodied experiences. (p. 224) (Note: This is all Gee has written on input. As his research is not focused on language learning, these principles are not specific to second language acquisition but can be somewhat related.)

Focus on Meaning	Ellis (2008) Principle 2: Instruction needs to ensure that learners focus predominantly on meaning. Brandl (2008) Principle 4: Input needs to be meaningful, comprehensible and elaborated Kumaravadivelu (2003) Contextualizing Linguistic Input Vygotsky (1978) Sociocultural Theory	**17. Situated Meaning Principle:** Meanings are not general or decontextualized. (p. 224) **21. "Material Intelligence" Principle:** Thinking, problem solving, and knowledge are stored in tools, technologies, material objects, and the environment. (p. 224) **33. Distributed Principle:** Meaning/knowledge is distributed across the learner, objects, tools, symbols, technologies, and the environment. (p. 227)
Sociolinguistic Exposure	Bachman (1990) Communicative Competence: Using language appropriately in context Kumaravadivelu (2003) Raising Cultural Consciousness	**30. Cultural Models about the World Principle:** Learning is set up in such a way that learners come to think consciously and reflectively about some of their cultural models regarding the world. (p. 226) **31. Cultural Models about Learning Principle:** Learning is set up in such a way that learners come to think consciously and reflectively about their cultural models of learning. (p. 226)
Pragmatic Feedback	Bachman (1990) Communicative Competence Holden and Sykes (2012) Pragmatic Feedback in Video Games Kumaravadivelu (2003) Fostering Language Awareness	

Figure 3. Combination of SLA principles and relation to game design principles

The first category is *input & output* of the language. In a real-world language learning context, the learner should have ample opportunity to both receive input and produce output in the L2, and in the process of doing so "negotiate meaning" with their interlocutors (Ellis 2008). In a game, this process cannot occur in the same was as in real life because true interaction and negotiation for meaning require more than one person. In a game, there are typically ample

opportunities to receive contextualized, authentic and diverse input which is key for language development (Chapelle, 2007), but opportunities for any kind of output, which is equally important, are limited. Typically, conversations in adventure games are spelled out as they are spoken in speech bubbles or textboxes. A plethora of other written input can be used in an adventure game as a clue or method of completing a task such as book pages, torn notes, letters, digital files, emails, signs, forms, business cards, text messages etc. More importantly, players receive feedback, which helps learners understand the result of the actions and know if they need to adjust or change the language they are producing. Feedback can be provided from the game as a sound effect or from a non-playable character (NPC henceforth) and inform learners of their comprehension and performance based on how they complete tasks. Often output takes the form of selecting pre-written/recorded responses but the technology exists to produce actual verbal or written responses through microphones, keyboards and touchscreens. However, integrating these opportunities is still advanced and time consuming for developers because the app would have to accurately evaluate L2 speech and writing samples. The potential is there, although its full capabilities have not yet been reached. Still, games can be designed for players to type messages, write letters, select correct responses in conversations, and say basic expressions easily, thus providing some opportunities for output.

Second, a game for language learning should provide the learner with ample opportunity to *focus on meaning* or "promote learning by doing" (Brandl, 2008, p. 12). Games are perfect environments to initiate task-based learning. Players are successful in completing the task if they have understood what was communicated to them. Directions or comments made by NPCs or internal dialogue from the main character are usually what inform the player of the next task that needs to be completed to progress in the game. In this sense, the game does not necessarily

explain vocabulary or grammar or quiz players on these aspects in a traditional way. Players communicate with NPCs and progress is made by understanding meaning and accomplishing tasks, not by arranging grammatical structures or filling in blanks with vocabulary. In terms of Gee's work, the "situated meaning principle" and the distributed principle" emphasize the importance that meaning is both contextualized and not absent from tools, symbols, the environment etc.

The next category is *sociolinguistic exposure.* This relates to knowing when different registers are appropriate, being familiar with regional accents or dialects, speech fillers and figures of speech (Bachman, 1990). Part of developing pragmatic competence is developing sociolinguistic competence, which can be partially achieved through exposure to authentic input in the target language. An educational adventure game can put the player in a variety of contexts and situations which may require using a different register. Each NPC can have a different voice, variety of the L2 and relationship to the player, exposing the learner to a wider variety of language use and register than the classroom can. This can feel more real in this type of game than during in-class role-plays because the player sees a virtual representation of the place where that register is used in reality and they can interact with other relevant objects and actors in that context. A game can even recreate landmarks, cities, and buildings from another country to give the learner more than a glimpse into what daily life is like there. Since Gee's principles are related to general learning and not specifically language learning, little is mentioned about sociolinguistics or pragmatics, but he does include a few principles related to reflecting on one's own cultural models of learning and about the world (see Gee's principles 30 and 31 above). They are relevant to both the *sociolinguistic exposure* and *pragmatic feedback* categories

because these categories involve being exposed to and reflecting on behavioral and linguistic differences that are part of another culture.

As mentioned above, Bachman (1990) conceptualizes pragmatic competence as central to developing language abilities. An educational adventure game can provide *pragmatic feedback* contextually in a way that an edutainment game cannot. Pragmatics relates to the various meanings language can have in different contexts. It is related to politeness as well as how to perform various "speech acts" such as apologizing, requesting, giving thanks etc. (Searle, 1979). Feedback is necessary in any language learning context to let learners know to what degree what they said/did/wrote was appropriate in a particular context and it helps them improve. Feedback is especially important in pragmatics because what is appropriate in a given culture is not always intuitive. Holden and Sykes (2013) showed in a study with an educational place-based game, *Mentira*, that feedback relating to pragmatic interactions can be given immediately and meaningfully because NPCs can react to player responses indicating successful or unsuccessful interactions. The game itself can provide feedback on these interactions as well though sound effects, "prizes, extra clues or other assets that are awarded or taken away in the game" (Holden & Sykes, 2013, p. 171). Since the player is already immersed in a narrative context and interacting with characters, there is ample opportunity to help develop L2 pragmatic competence.

Technological Criteria

The technological principles have been summarized into just two categories for ease of rating and are combined and adapted from the criteria present in Fernández-Pampillión Cesteros et al., (2012). Those criteria were originally made for edutainment style apps not educational games, therefore I adapted them in the ways described below.

The first, usability, generally means that the game is "easy to learn, effective to use, efficient and enjoyable from the user's perspective" (Kukulska-Hulme, 2005, p. 45). My category *usability* also combines the principles usability, accessibility and interoperability found in Fernández-Pampillión Cesteros et al., (2012) and the "user friendliness" category from Newton and Dell (2011). These principles also mean that the game is accessible on as many operating systems as possible, it does not crash or take a long time to load and is updated regularly. In addition, it is coded properly so that all buttons work and there are no ways to get "stuck" in the game. Game navigation and game functions are overall intuitive or well explained. Usability is a vital characteristic of any app or game for language learning because usability allows learning to occur without impediment and can enhance users' access to educational functions of the app or game (Kukulska-Hulme, 2005).

The second technological principle has to do with graphics and sound design of the game and is based loosely on the format and design category in Fernández-Pampillión Cesteros et al., (2012). Because sounds and graphics play such an important role in the communication of meaning, they are vital for language learning. Additionally, a study done by Wood, Griffiths, Chappell and Davies (2004) surveyed close to 400 people to better understand the psychology of gaming and what makes games so enjoyable. The participants rated realistic sound effects, high-quality realistic graphics, character development and "rapid absorption rate" (fast to learn) as the qualities of a game that were most important to them. According to these results, good quality sounds and graphics may motivate more players to download and continue to play the game.

Evaluation Process

After researching principles of game design, I played both SDN and MM straight through and took very detailed notes on the storyline, characters, the language used, puzzles and their

solutions, cultural references, inclusion of task-based activities, opportunities to make choices, how instructions were given and other principles of game design. This was not the first time I had played these games. The first time I played them was as a learner, six years prior to this study. After creating the rubric, I reviewed these notes and gave each game an initial score in each category. After this, I replayed each game another time to double check the scores I gave each game and make adjustments. Some scores were adjusted based on game comparison. For example, in the category visually and aurally appealing, SDN originally scored 3 but after replaying MM (which scored a 4 of 4) and noticing how much more advanced the soundtrack, sound effects, camera angles, scene detail and 3-D elements were, SDN's score dropped to a 2 to demonstrate just how much the games varied in this category.

Results & Discussion

The first section of results will detail the evaluation and scores of the two mobile games, The Sky Disc from Nebra and A Mysterious Mission (SDN and MM henceforth). The second section of the results will summarize the English, Spanish and German language user comments posted on the Google Play Store from the games' release date through January 2018. No data were collected from the Apple Store because there were not enough comments. Figure 4 below shows the icons for each of the games to help interested readers find them more easily online and to help visualize each game while reading further.

Figure 4. App Icons of *The Sky Disc from Nebra (SDN)*, left and *A Mysterious Mission (MM), right*

Game Evaluation

Sky disc from Nebra

The first game, *The Sky Disc from Nebra (*German*: Abenteuer Deutsch-Das Geheimnis der Himmelscheibe)* was released in 2011 for Apple and 2012 for Android and produced by the German serious game developer Reality Twist GmbH and directed by the Goethe Institute. The target audience was high-school to university age German as a foreign language learners at the A2 (intermediate mid) level. The learner takes on the role of a young Italian art expert, Vincent, who receives a mysterious email requesting he come to Germany and investigate a suspected forgery of the Sky Disc that was recently found in Nebra, Germany. There are listening comprehension tasks (following street directions on a map), sentence unscrambling activities, drag and drop forms to fill out and other language activities that are integrated with the narrative. There are 70 minutes of conversations in German (written by Goethe Institute) and 60 minutes of different music and sound effects ("Goethe-Institut und Reality Twist", 2011). The graphics are 2-D and the art is comic-style.

Category	Sub-Category	Score _/4
Game Design	Consequence Reduction	4
	Character Development	2
	Pleasantly Challenging	4
	Learning Preferences	2
Language Learning Principles	Input/output	2
	Focus on Meaning	4
	Sociolinguistic Exposure	2
	Pragmatic Feedback	1
Technical Criteria	Usability	1
	Visually and Aurally Pleasing	2
	Total	**24**/40

Figure 5. Rubric Score of *The Sky Disc from Nebra.*

Consequence Reduction

SDN scored a four in this category because Vincent is in several situations that may be stressful if a user experienced them in real life. Simply being a visitor in a foreign country and trying to navigate with limited language skills, as Vincent must do, could be very intimidating. Throughout the game Vincent asks strangers questions about the area and about tasks he needs to complete. Occasionally, the player must arrange words to make a sentence. If arranged incorrectly, the NPC simply says something like, “Wie bitte? (excuse me?)” and the player is given another chance until they order the words correctly. Of course, in real life making grammatical mistakes can lead to confusion and potentially embarrassment. In this environment, affect is minimized, and the player can “play with the language” as much as the game allows. Another example is the player can take their time to count out money at the restaurant and the grocery store. In real life, a customer at a typical German grocery store is expected to pay and bag their items as quickly as possible; for someone unfamiliar with the language and currency they may struggle accomplishing this and making sure they received the correct change. In the game players can experiment with coins and bills for as long as they need. Even though these

are not necessarily high-stakes situations, they are appropriately challenging for learners at the A2 level.

Character Development

SDN only scored a two in this category because there are no opportunities in the game to adapt Vincent's character or make choices. Every time the game is played, the exact same interactions will take place. However, the game can end in several different ways depending on how Vincent chooses to react to the final scenario but this opportunity only happens once in the game. The player may feel little connection to the character and like they have a more passive role in the progression of the game.

Pleasantly Challenging

This category scored full points because the game evenly increased the difficulty of puzzles and language throughout the game. First, the player can choose help in German or in English, which may help some learners' comprehension of game functionality if their English is better than their German. Second, there are two main puzzle types in SDN, word ordering puzzles and following directions. Each puzzle clearly increases with difficulty as the game progresses. For example, the first word order puzzle in the game is this sentence: "Vielen Dank für Ihre Hilfe. (Thank you for your help)" and two of the final word order puzzles are: "Ja! Ich glaube, dass sie in den Wald gelaufen ist! (Yes! I think that she got lost in the forest!)" and "Super! Dann können wir die Speicherkarte an deinem Handy lessen? (Super! Then can we view the SD-Card on your cell-phone?)". The later sentences expose users to past tense, multiple clauses and the accompanying change in word order, modal verbs, use of dative and accusative cases, and subject-verb inversion in questions. With these puzzles, the user experiences a whole range of A2 grammatical content but it is scaffolded with more challenging content at the end.

For the second type of puzzles, following directions, several changes are made to make each set of directions more complicated. The first set are simple street directions from the airport to the hotel. The player hears only one direction at a time and can repeat them as many times as needed. Later the user is expected to listen to directions to locate a city in Germany on a map. The final set of directions is heard in one long monologue and the recording itself is intentionally full of static and breaks-up. These directions navigate Vincent to a safehouse in the forest and require the player to identify more obscure landmarks and natural features in the landscape.

Learning Preferences

SDN only scored a two in this category because the player is often given information in one form and does not have an opportunity to receive it in another. This could become problematic in several instances. For example, there is an article in the museum that is the key to solving the final puzzle but, the article uses advanced vocabulary and grammar. Even solid A2 level learners may find it difficult to read the entire article and extract the necessary information. Another example of favoring one learning preference is in the restaurant. There are no pictures of the food in the menu or once the food “arrives”. The learner guesses which dish it is and never sees an image of what Vincent ordered. For example, Vincent might think to himself (for the player to know), “I want something with chicken…”. The player looks for the item on the menu that includes chicken and that is it. There are no visual aids, so the game loses an opportunity to reinforce learning by accommodating learner preferences and utilizing a range of modalities. It is also a shame considering the menu is all traditional German food and learners likely won’t already know what the dish is or what it looks like.

Input & Output

This category only received two points because the player has the opportunity to interpret a lot of meaningful input in order to complete tasks in the game but never has the chance to produce any linguistic output themselves.

Focus on Meaning

SDN got full points for this category because there is a multitude of activities and tasks that require understanding of verbal or written language at the A2 level to complete. Each of the direction activities require correctly following instructions to arrive at the proper destination. To practice numbers, Vincent takes a number and waits his turn at an insurance agency. The player must recognize their number when called and the counter number they are assigned to. The player completes a similar activity to pay for meals in the restaurant. To practice giving physical and personal information the learner must remember how the insurance agent described the journalist and ask other NPCs if they have seen her. If Vincent describes her correctly he is told where she is and if he remembers incorrectly then he has the chance to try again. To use most objects within the game Vincent must talk to the right NPC for verbal instructions on what to do with it before he can progress.

Sociolinguistic Exposure

Sociolinguistic exposure scored a two in SDN because there was little exposure to figures of speech, dialect and natural speech fillers such as *äh, tja, geh, gel* or *na* to name a few. This is especially odd because the game mostly takes place in Stuttgart, the capitol city of Baden-Württemberg which is known for having a distinct regional accent/dialect and cuisine. None of this is alluded to in the game. All characters, regardless of age or which city they are in, share the same standard German dialect, rate of speech and lack of speech fillers. There are not any idioms

or typical sayings until the very last moment of the game “Ende gut, alles gut (all’s well that ends well)”.

There are good uses of register change however. There is a clear difference between how Vincent communicates with the professor, civil servant, waitress and front desk attendant at the hotel and the university student and journalist he befriends. The user is exposed to formal and informal pronouns and verb forms, even if they do not make decisions themselves about when to use each form.

Pragmatic Feedback

SDN scored one in this category for two reasons. First, there is no opportunity for Vincent to make mistakes when preforming common speech acts such as, making requests, apologizing or giving compliments. All pragmatic interaction happens under the surface and attention is not drawn to them when they do happen. Vincent simply does not make mistakes; therefore, learners never explicitly learn how to linguistically redress an awkward situation. The second reason is that during the word reorder puzzles Vincent does not get a chance to use strategies to verbally correct himself. The NPC might say, “excuse me?” or “what did you say?” and without another word from Vincent the player attempts to reorder the words again. For better real-world application, it would be helpful if the player could correct his/her mistakes in a linguistically natural way such as, “I mean…” or simply a quick “sorry…”, all of which the game excludes.

Usability

SDN got a score of one for usability. Based on the data in user comments (below), the app is prone to crashing upon opening, rendering it unplayable. Google play shows the last update was in 2012, the same year as its release. Additionally, navigation in the game could be

more intuitive. Even after playing this game multiple times, it was not always clear where to tap (especially when attempting puzzles) in the game or what to do next. There is a small tutorial in the beginning but most information relevant to game play is found in an FAQ section of the main menu. Gee (2005) explained the need for *sandboxes* at the beginning of games allowing players to learn game functions in a practice environment. SDN attempts this principle but does not execute it successfully. There are also several small inconsistencies such as the front desk attendant at the hotel telling Vincent that his room is 203 but he can only access his room by tapping a door on the first floor. If the player taps anywhere on the second floor, they enter the restaurant. This confusion and aimless tapping could have been corrected by including an elevator or stairs that led to his room.

Visually and Aurally Pleasing

SDN scored a two in this category because the sound effects were mostly realistic but there could have been more animation in the game. The graphic design of the game is all 2-D and uses comic book/story book-like illustrations. There are small animations that occur in the backgrounds such as a streetcar whizzing by, a man in a waiting room stretching his arms, or the wind blowing some flags but for the most part the player cannot interact with the virtual environment. In support of the graphics and animations of the game, the characters move their mouths (inaccurately) as they speak, and Vincent has several facial expressions and body positions as he talks.

The game is filled with very realistic background noise and sound effects that make the environment feel more realistic for the player. The insurance agency for example is filled with the sounds of shuffling paper, unintelligible conversations of passersby and the sound of numbers being called.

Overall this game scored 23 of 40 total points. Its strengths were in exposing the learner to a lot of rich input, relying on task-based activities based on linguistic input throughout the game and gradually increasing the difficulty of language and puzzles. It scored weaker for being a widely unusable and non-intuitive app, not providing pragmatic practice or feedback or allowing the player to make decisions. For reference, SDN received 3.2 out of 5 stars on Google Play.

A Mysterious Mission

The next game, *A Mysterious Mission* (German: *Ein Rätselhafter Auftrag*), was released in 2013 for Apple and Android in a regular and HD version (both free to download) and produced by the German game company OVOS and directed by the Goethe Institute. The target audience iss college-age learners of German as a foreign language at the B1 level (advanced low) who may be considering Germany as a location to complete an internship or to find work. The learner assumes the role of a young Irish Journalist, Jayden, who is summoned to Germany by her uncle who started a prominent tech company there, but he has mysteriously disappeared. She gets a job at his company so she can go undercover and investigate his disappearance. There are drag and drop forms to fill out (resume, cover letter, emails), reading and listening tasks, and an added element of pragmatic competence that is not present in the first game. There is a meter on the home screen that keeps track of the player's score in relation to these answers. The world is 2-D, but the avatar is 3-D and can be moved around in the game environment.

Category	Sub-Category	Score _/4
Game Design	Consequence Reduction	4
	Character Development	3
	Pleasantly Challenging	2
	Learning Preferences	4
Language Learning Principles	Input/output	3
	Focus on Meaning	4
	Sociolinguistic Exposure	3
	Pragmatic Feedback	4
Technical Criteria	Usability	4
	Visually and Aurally Pleasing	4
	Total	**35**/40

Figure 6. Evaluation of *A Mysterious Mission*.

Consequence Reduction

MM scored full points as opposed to SDN's three points in this category because of the variety and number of high-stakes situations the player has to navigate in the game. Not only is she put into situations that require complex linguistic functions such as job interviews and giving a presentation at a conference, she is also temporarily held hostage by criminals and must physically confront the culprit. A game can put players into exciting situations that would be dangerous, if not deadly in real life. Linguistically, players operate in the German speaking world without making mistakes that cause miscommunication or that embarrass them. Through Jayden, the player is operating in a German speaking environment at a high level of fluency, which may create positive transfer in real life, if they become more willing to use their full range of German abilities.

Character Development

MM scored three in this category because the player can determine some of Jayden's personality traits by choosing how she responds to people and the game does not penalize the

player based on these choices. Through Jayden the player can choose how the game progresses. She can be outright rude, impatient, unprepared or polite, patient and sharp. Even though the player is given a character with a predetermined backstory and purpose in the game, players have significant say in how she chooses to interact with other characters. However, these choices do not impact the overall outcome of the game.

Pleasantly Challenging

This game scored two in this category because it is often too challenging both linguistically and in terms of puzzles, unlike SDN which scored full points for more evenly distributing challenges and their difficulty. Learner comments often pointed out that the language was too difficult and German comments described the difficulties they were having with puzzles which at times, turned the German comment section into a help forum. The game has a built-in method to aid users who are stuck with “hint coins” that are hidden throughout the game environment.

Learning Preferences

MM earned full points for accommodating learning preferences because there are multiple ways to access information or instructions in the game. For example, in the beginning of the game Jayden can choose to read the entire letter that her uncle wrote to her or quickly summarize it verbally. For the player this looks like reading a long letter with the key information highlighted or hearing Jayden’s voice verbally explaining the key points. Another example of this is when Jayden first arrives at her uncle’s company and needs to find the IT department. She gives instructions on how to get there but she also tells the player they can look at the labelled map. Finally, there is a very helpful feature in the game called “The Story Thus Far” that the player can review at any time during gameplay. They play the game that

summarizes what Jayden has done and is accompanied by images. There is a similar section that summarizes each new character as well. At the beginning of the game the player can choose to have this information in English, Spanish or German.

Input & Output

MM scored a three in this category because there are numerous opportunities to speak with many different NPCs in the game and the conversations will be different each time the user plays the game, which increases the amount of potential input the player can receive. Additionally, there are many ways to interact with the game environment and receive feedback, in the form of some comment from Jayden. For example, as the player explores, objects they tap will provide clues and others will not. Jayden will make a short comment on the ones that do not provide clues, often these comments are funny or insightful. For example as she looks for a pair of misplaced scissors she says, “Es ist wie in einem Computerspiel. Da warden Dinge auch immer an verrückten Stellen versteckt (It is like in a computer game. Things there are also always hidden in crazy places)”.

However, like SDN, there are very few opportunities to produce output. The learner types words into the game on occasion but this is more of an edutainment strategy because it is not meaningful output. For this reason, MM did not score higher, despite rich opportunities for input.

Focus on Meaning

Like SDN, MM relies on many task-based techniques for the learner to complete activities and puzzles in the game based on information collected from NPCs, so it also received full points. For example, Jayden must determine who stole a package from the boss’s safe based on information they tell her which is then found abridged, in written form in a notebook that the player uses to determine who the liar is. Only when she has correctly identified the liar for the

boss can she confront the thief and get the package. Each main puzzle requires synthesizing linguistic information and reaching some sort of conclusion to complete a task. Interestingly, MM also includes a few language puzzles that are not task-based. Each time Jayden finds a new package there is an SD card that is protected with a password. The password is a riddle or a word puzzle when the player has to solve it and type it into the game. Since there were only a few of these puzzles and they were very short they did not detract from the overall score.

Sociolinguistic Exposure

MM received a three in this category. It scored better than SDN because there are many German figures of speech, idioms, jokes and several occasions in which speech fillers are used. It did not score full points because there are no dialectal differences or different accents used in the game. Even though there was an excellent opportunity in the game to include different varieties of German because the employees in the IT department are supposed to be from Switzerland, Austria, Luxembourg and various places in Germany, yet the voice actors all use the same standard, slow German. This may be to accommodate language learners' comprehension, but it is also a missed opportunity for sociolinguistic exposure and does not help prepare them for the type of language they will encounter abroad.

Pragmatic Feedback

MM also scored full points in the *pragmatic feedback* category, unlike SDN which almost entirely left this aspect out of the game. One of the main aspects of interaction in MM is pragmatic feedback during conversations. During some conversations, Jayden has three response options. One is neutral, another is polite (or best represents accurate information to test reading or listening comprehension) and another is rude (or false information). While this lets the character develop Jayden's persona it also provides them with feedback for how others will react

to certain comments or behaviors such as answering the phone or declining an invitation. In the beginning Jayden is expecting a call for a phone interview. She can choose to answer the phone with a formal greeting, personal greeting or no greeting at all. The interviewer reacts differently to each greeting. This is a semi-explicit way of providing feedback because the player chooses the type of greeting and then hears an example of it and observes the reaction of the NPC. This method is slightly inauthentic because the outcome of Jayden getting the job and solving the mystery are not affected by what Jayden says or does. She can be very rude and give poor examples of her experience during the job interview, but the interviewer is still convinced that Jayden is the right person for the job. Despite its inauthenticity, this is appropriate for a virtual environment where the goal is learning. Jayden is usually reprimanded and often told explicitly, "It is better if you…. when answering the phone", for example.

Usability

MM earned full points for usability. Very few users reported bugs or other errors, it is usable on many devices and operations in the game are very well explained or intuitive, unlike in SDN. For example, tappable objects in the game will discreetly sparkle after a certain duration of inactivity. In addition to that feature, there is a magnifying glass icon in the upper right-hand corner that when tapped, reveals all the parts of the environment that can be interacted with and how. For example, flashing magnifying glasses appear in front of objects, flashing speech bubbles in front of people, a little opened door icon in front of entrances and exits and a set of gears means that the object can be combined with an object from Jayden's bag, all which helps prevent the user from resorting to frustratedly tapping the screen at random to find a clue.

There are other helpful features that improve game usability. Every time a new activity or puzzle type is introduced, a new screen quickly pops up giving a brief yet helpful explanation to

complete the activity. Additionally, the game is divided into chapters, so the user has an idea of their progression in the game and new locations on the map are distinguished from already visited locations both enhancing the organization and therefore, usability, of the game.

Visually and Aurally Pleasing

Again, MM earned four of four points for sound and graphic design. The Google Play Store comments often commented on how well-made the game is relating to the storyline, graphics and soundtrack. Not only is the game filled with a variety of realistic sound effects, it includes a soundtrack. There is music accompanying gameplay depending of the mood of the scene.

The game environments are 2-D but drawn from different camera perspectives and each location has different rooms to enter or paths to follow. Unity 3D, a cross-platform game engine, was used to create Jayden and move her around the game environment ("Entwickler Interview", 2013). Being able to move Jayden around and see her walk makes the game feel more realistic, which was one of the key components players appreciated when playing games (Davies, 2004).

Overall MM scored 35 of 40 points. It scored high it almost every category, but it was especially strong in accommodating learner preferences by using various methods to provide information, giving the player pragmatic feedback in a variety of low- and high-stake situations and having bug-free code and intuitive gameplay. It scored less strongly in *pleasantly challenging* because puzzles and language were often too difficult and in *input/output*, for providing few to no opportunities for output. For reference, the HD version of MM received 4.3 points out of five stars and the regular version of MM received 4.1 out of five stars on Google Play. The key reasons MM scored higher than SD were that it was usable and did not crash, it

provided learners with considerably more feedback and there were more opportunities for character developments and accommodating learning preferences.

Player Comments

The results of the player comments were partially alluded to above, but further trends will be discussed here. For both games the graphs titled *learner comments* include only comments made in English or Spanish. The users commenting in these languages are assumed to be learners of German, though their first language is impossible to determine with 100% certainty. These comments were then compared to comments made in German in the graphs titled *comparison of user comments.* The German comments were considered to be written by native or high proficiency speakers, though again, it is impossible to be certain.

The comments made about SDN were divided into six categories based on major trends found in the data and considering the categories of the rubric. Figure 7 shows the percent of total comments that fell into each category (comments that did not comment on a specific aspect of the game e.g. “Cool app!” were not counted). Unfortunately, 82% percent of users complained of a bug that made the game crash before they could start playing. Comments also mentioned the app not working on all phone models and it was not updated after the first year of being released. Those who could play the game (it seemed to still work on Android tablets, and on the web app) praised it for being *entertaining and fun* and *helpful to learning*, which were the next highest categories (6% and 7% respectively).

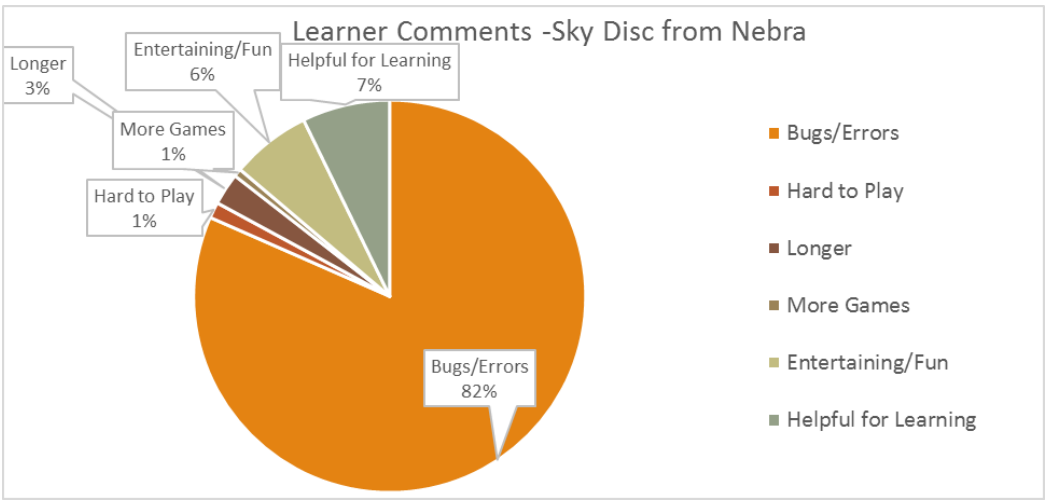

Figure 7. English and Spanish Language Comments about *Sky Disc from Nebra*

Figure 8 below shows a comparison of German language comments to the combined English and Spanish language comments. Findings from the German language data were remarkably like the English and Spanish language data with two key differences. Predictably the German language comments did not comment on the app being *helpful for learning* but surprisingly the German language data also showed a greater desire for *more games* of this sort.

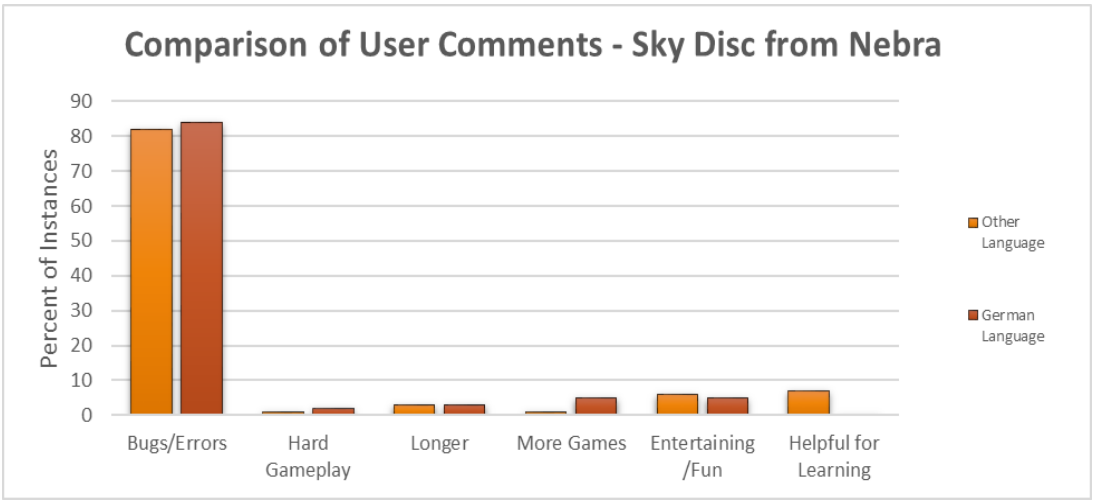

Figure 8. Comparison of German and English and Spanish Language Comments about *Sky Disc from Nebra*

Figure 9 shows the English and Spanish language comments for MM which were considerably more diverse with nine different categories of comments. Since *bugs and errors* only accounted for 7% of user comments, users could actually play the game and leave more through comments. Most comments praised the app for being *good for learning* (34%) and *entertaining/fun* (25%). These categories were followed by users requesting *more games* (12%) of this kind and commenting on how *well-made* (11%) the game was, often mentioning the graphics and sound effects/music specifically.

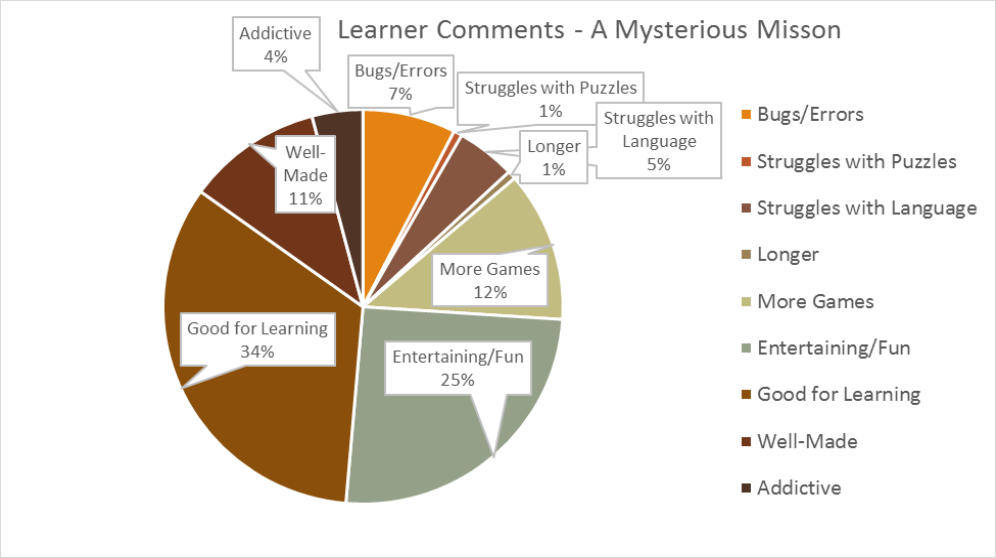

Figure 9. English and Spanish Language Comments about *A Mysterious Mission*

Comparing the learner comments to German language comments for MM revealed some interesting trends as well (Figure 10). Both groups found the apps to be equally *entertaining/fun*, *well-made* and *addictive*. Like comments made for SDN, the German group did not comment often on the app being *good for learning* or that they had *struggles with language*, but they did comment more often on their desire for *more games* of this kind and they often wished the game had been *longer* (gameplay is a minimum of 3 hours).

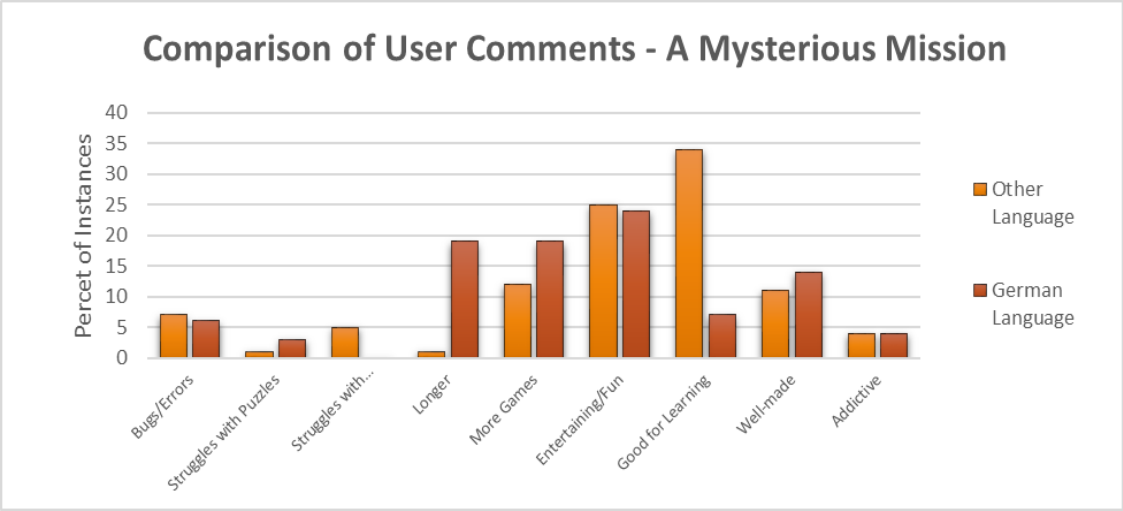

Figure 10. Comparison of German and English and Spanish Language Comments about *A Mysterious Mission*

Considerations for a Mobile-Based Educational Adventure Game for ESL or EFL

The purpose of this section is to elaborate on considerations for a mobile-based educational adventure game specifically for ESL/EFL. In other words, why could the games made by the Goethe Institute not be translated into English and become successful tools for learning English? A key consideration is that German and English play different roles in a global context. As English has become a global language, there are more countries and communities to keep in mind in an ESL/EFL game than a German as a foreign or second language game. For this reason, there are several categories from the rubric that would need special attention for the future development of such a game for learning English: *character development*, *pragmatic feedback* and *sociolinguistic exposure*. All other categories should certainly be considered, and as technological capabilities and understanding of game design improve, special attention should also be placed on the *input/output* category.

First, the purpose of the mobile game needs to be determined because that will create a different set of learner needs. Will the game be for ESL or EFL? This question itself would produce very different games as a game for ESL may need to include the player navigating everyday life in the chosen country such as finding somewhere to live, opening a bank account or simply learning about the community they now are a part of. A game for EFL may be more similar to SDN and MM and allow the player to travel temporarily to the chosen country/city and visit different landmarks, universities or companies. Overall, it may be easier to create an educational adventure game for EFL purposes because it does not require the same level of specificity regarding location as an ESL game might. Place-based games, such as *Mentira*, which are based in a certain city and require players to visit specific locations, may be a better option than adventure games for ESL because of the opportunities for community interaction that place-based games can offer (Holden & Sykes, 2013). There are other important considerations to be addressed during the early development stages such as establishing target audience demographics, language level and choosing which leveling system the game will use (CEFR, ACTFL) to name a few. If the EFL game is made for European or even Asian Students, creating games based on CEFR levels may make it easier for these students to self-select which apps are appropriate for them as CEFR is commonly used in these places.

Character Development

In terms of character development, SDN and MM did not give the learner much room to develop a character from scratch. Jayden and Vincent act more as liaisons for the player to experience the game through and they are relatable mainly to white Europeans. In a game for ES/FL it may be beneficial for the player to have more freedom in designing the character's appearance, biographical information and variety of English they use throughout the game.

Including this aspect may be costly, as multiple voice actors would have to be hired to record the same character multiple times. Additionally, alterations in the main character may require the game to take different paths, adding significant time to initial programming. To help alleviate the time and financial constraints, the game could instead be designed to allow the player to choose between a few pre-set characters to complete the game with.

Pragmatic Feedback

When creating MM, the Goethe Institute did not choose to focus exclusively on language and grammar use but also, pragmatics and cultural norms. At one point in the game Jayden even finds a pamphlet on intercultural communication and uses it to give tips to a German man and a foreign woman having a disagreement. Throughout the game similar principles are practiced more or less explicitly as Jayden describes what is and it not necessary to include on a resume (religion and marital status) and during other parts of the game. Some of these aspects are very helpful to include but at other times they may help promote cultural stereotypes. A lot of quality research about regional or country-specific cultural and pragmatic norms would need to go into an adventure game developed for EFL.

Sociolinguistic Exposure

It is not enough to focus exclusively on what has historically been considered standard English from the U.S. or U.K. Today's English learners will not likely be exposed to only one variety in real life so, in an educational ES/F/IL adventure game, "non-standard" varieties of English, dialect and accent should not be left out and that exposure should not be reserved for advanced speakers either. At first it seems overwhelming to try and consider every variety of English in one adventure game but that is the advantage of making mobile-based games. A

different app could be produced for different countries in the world and NPCs could represent speakers from different backgrounds.

Input & Output

Both German games were able to provide extensive and rich input, but both lacked opportunities for learners to provide meaningful output. Yet, producing meaningful output is a vital component of developing any language abilities, let alone English language abilities, because it contributes to successful "negotiation of meaning" (Ellis, 2008). When a learner produces output and receives feedback they are probing their understanding of the second language and improving their communication skills. The exclusion of opportunites for output production was likely because of time and budget constraints. From a technological standpoint, it is more difficult to design software that can assess verbal or written input. However, as technological capabilities and understanding improve, designers should push for educational adventure games for language learning to provide learners with more opportunities to produce meaningful written and spoken output.

Limitations

This rubric is still a subjective evaluation tool and another player or language instructor could rate them differently. Additionally, while I tried my best to keep bias out of evaluation, no judgement is truly objective, especially since I have played these games before as a German learner when my skills were around the A2 level. Playing them now with German C1 level may have made them easier for me since I did not struggle understanding the language and by extension, the language tasks. Moreover, other evaluators may have found other principles from Gee (2007), Ellis (2008) or general SLA research more appropriate to include than the ones I did in the rubric. I tried to justify which ones were selected in the methodology section; however my

experience playing the games as a learner may have skewed which pedagogical principles I found most important, particularly because I view these games as opportunities to mimic real-world experiences with language rather than classroom instruction. For that reason, SLA principles regarding instruction techniques and focusing on form e.g. grammar, structure were left out of the evaluation tool and principles related to meaning, culture and communication were favored. Finally, while user comments can offer valuable input and feedback, they can also be unreliable or skewed because of the general tendency to leave comments when dissatisfied.

Conclusion

Mobile-based adventure games for language learning could be highly motivating, communicative and enjoyable tools to supplement foreign language study. Additionally, they are cheaper and faster to develop than full software programs or console games and they reach a wider market of language learners. This exploratory study demonstrated the potential for this kind of game. Hundreds of thousands of German learners and speakers downloaded these two games and there was a high demand for more games like it. The Goethe Institute has continued to make a variety of apps and other digital media that have been well-received. I hope that the rubric I created can be used as a starting point or reference by teachers, students or game designers to evaluate a completed game for language learning or even serve as a beginning checklist for development of a potential game. While others may choose different elements within each category, it is important that educational adventure games for language learning be evaluated in terms of game design principles, language learning principles and technological criteria. The inclusion of these three elements highlights the importance of interdisciplinary development of such games. App developers, game designers and language and culture specialists all need to weigh in on such a project to ensure its success.

References

Apple: Most popular app store categories 2018. (2018, January). Retrieved April 29, 2018, from https://www.statista.com/statistics/270291/popular-categories-in-the-app-store/

Assigning CEFR ratings to ACTFL assessments [PDF]. (n.d.). Alexandria, VA: American Council on the Teaching of Foreign Languages. Retrieved May 6, 2018, from https://www.actfl.org/sites/default/files/reports/Assigning_CEFR_Ratings_To_ACTFL_Assessments.pdf

Azar, A. S., & Nasiri, H. (2014). Learners' attitudes toward the effectiveness of mobile assisted Language learning (MALL) in L2 listening comprehension. *Procedia - Social and Behavioral Sciences*, *98*(Supplement C), 1836–1843. https://doi.org/10.1016/j.sbspro.2014.03.613

Bachman, L. F. (1990). Communicative language ability. In *Fundamental Considerations in Language Testing* (pp. 81-103). Oxford: Oxford University Press.

Borges, V.C. (2014). Are ESL/EFL software programs effective for language learning? *Ilha Do Desterro*, (66), 19-74.

Brandl, K. (2008). *Communicative language teaching in action: Putting principles to work*. Upper Saddle River, NJ: Pearson Prentice Hall.

Chapelle, C. A. (2007). Technology and second language acquisition. *Annual Review of Applied Linguistics*, *27*, 98–114. Cambridge University Press.

Chen, H. J. H., & Yang, T.Y. C. (2013). The impact of adventure video games on foreign language learning and the perceptions of learners. *Interactive Learning Environments*, *21*(2), 129–141. https://doi.org/10.1080/10494820.2012.705851

DeKeyser, R. (2014). Skill acquisition theory. In B. VanPatten & J. Williams (Eds.), *Theories in*

Second Language Acquisition: An Introduction (pp. 94-112). Routeledge.

Dondlinger, M. (2007). Educational video game design: A review of the literature. *Journal of Applied Educational Technology, 4*(1), 21-31.

Ellis, R. (2008). Principles of instructed second language acquisition. CAL Digest.

Entwickler-Interview zum “Lernabenteuer Deutsch – Ein rätselhafter Auftrag” | in-ga.me. (2013). Retrieved October 23, 2017, from http://www.in-ga.me/entwickler-interview-zum-lernabenteuer-deutsch-ein-ratselhafter-auftrag/

Fernández-Pampillón Cesteros, A., Domínguez Romero, E., & Armas Ranero, I. (2012). *Herramienta de evaluación de la calidad de objetos de aprendizaje: Guía para la producción y evaluación de materiales didácticos digitales* (Tech. No. 1.1). Retrieved http://eprints.ucm.es/12533/1/COdAv1_1_07jul2012.pdf

Gee, J. P. (2005). Good video games and good learning. *Phi Kappa Phi Forum*, p. 33. Retrieved from http://norcalwp.org/pdf/Gee--Learning_Principles_Articles.pdf

Gee, J. P. (2007). What video games have to teach us about learning and literacy. New York: Palgrave Macmillan.

Goethe Institute. (n.d.). Organisation. Retrieved April 06, 2018, from https://www.goethe.de/en/uun/org.html

Goethe-Institut und Reality Twist vermitteln deutsche Kultur und Sprache per Serious Game. (2011, November). Retrieved April 29, 2018, from http://www.reality-twist.com/en/goethe-institut-und-reality-twist-vermitteln-deutsche-kultur-und-sprache-per-serious-game/

Google Play: Most popular app categories by downloads 2017 | Statistic. (2017). Retrieved April 29, 2018, from https://www.statista.com/statistics/256772/most-popular-app-categories-in-the-google-play-store/

Grace, L. (2005). Game type and game genre. Retrieved May 6, 2018, from https://www.researchgate.net/profile/Grace_Lindsay4/publication/262250061_Game_Type_and_Game_Genre/links/00b4953720b67e6606000000/Game-Type-and-Game-Genre.pdf?origin=publication_detail.

Hatami, S. (2013). Learning styles. ELT Journal, 67(4), 488-490. doi:10.1093/elt/ccs083

Hirumi, A., & Stapleton, C. (2008). Applying pedagogy during game development to enhance game-based learning. In C. T. Miller (Ed.), *Games: purpose and potential in education* (pp. 127-162). New York, NY: Springer Science Business Media

Holden, C. L., & Sykes, J. M. (2013). Complex L2 pragmatic feedback via place-based mobile games In N. Taguchi & J. M. Sykes (Eds.), *Technology in interlanguage pragmatics research and teaching* (pp. 155-183). Philadelphia: John Benjamins B.V.

Krashen, S. D. (1985). Chapter 1: The Input Hypothesis. In *The input hypothesis: Issues and implications* (pp. 1-32). Boston: Addison-Wesley Longman.

Kukulska-Hulme, A. (2005). Mobile usability and user experience. In A. Kukulska-Hulme & J. Traxler (Eds.), *Mobile Learning: a handbook for educators and trainers* (pp. 45-56). New York, NY: Taylor & Francis Inc.

Kumaravadivelu, B. (2003). *Beyond methods: Macrostrategies for language teaching*. New Delhi: Orient Longman.

Lantolf, J. P., & Thorne, S. L. (2009). *Sociocultural theory and the genesis of second language development*. Oxford: Oxford Univ. Press.

Liu, P.-L., & Chen, C.-J. (2015). Learning English through actions: a study of mobile-assisted language learning. *Interactive Learning Environments*, *23*(2), 158–171. https://doi.org/10.1080/10494820.2014.959976

Longcope, P. (2009). Difference between the EFL and the ESL language learning contexts. *Language and Culture Theory / Graduate School of International Languages and Cultures, Nagoya University ed.*, *30*(2), 303-320.

Lyddon, P. A. (2016). Mobile-assisted language learning and language learner autonomy. In S. Papadima-Sophocleous, L. Bradley, & S. Thouësny (Eds), CALL communities and culture – short papers from EUROCALL 2016 (pp. 302-306). Research-publishing.net. https://doi.org/10.14705/rpnet.2016.eurocall2016.579

Malone, T. (1980). What makes things fun to learn? heuristics for designing instructional computer games. *Proceedings of the 3rd ACM SIGSMALL Symposium and the First SIGPC Symposium on Small Systems*, 162-169.

Marlina, R. (2017). Teaching EIL: Calls to implement change. *Teaching English as an International Language: Implementing, Reviewing, and Re-envisioning World Englishes in Language Education* (First ed., pp. 11-48). London: Taylor and Francis.

Martín-Monje, E., Arús-Hita, J., Rodríguez-Arancón, P., & Calle-Martínez, C. (2014). REALL: Rubric for the evaluation of apps in language learning. *E-Prints Compultense*. Retrieved from http://eprints.ucm.es/25096/

McKay, S. (2002). *Teaching English as an international language: Rethinking goals and approaches* (Oxford handbooks for language teachers). Oxford: Oxford University Press.

Newton, D. A., & Dell, A. G. (2011). Evaluating the effectiveness of apps for mobile devices. *Journal of Special Education Technology*, *26*(4), 59-63.

Oxford, Rebecca L. (2003). Language learning styles and strategies. *International Review of Applied Linguistics in Language Teaching, 41*(4), 271-414.

Rodríguez-Arancón, P., Arús, J., & Calle, C. (2013). The use of current mobile learning applications in EFL. *Procedia - Social and Behavioral Sciences*, *103,* 1189–1196. https://doi.org/10.1016/j.sbspro.2013.10.446

Prensky, M. (2001). *Digital game-based learning*. New York: McGraw-Hill.

Ranalli, J. (2008). Learning English with *The Sims*: exploiting authentic computer simulation games for L2 learning. *Computer Assisted Language Learning*, *21*(5), 441–455. https://doi.org/10.1080/09588220802447859

Reid, J. M. (1987). The learning style preferences of ESL students. TESOL Quarterly, 21(1), 87-111.

Reid, J. M. (Ed.). (1995). *Learning styles in the ESL/EFL classroom*. Boston, MA: Heinle & Heinle.

Reinhardt, J., & Sykes, J. M. (2012). Conceptualizing digital game mediated L2 learning and pedagogy: Game-enhanced and game-based research and practice. In H. Reinders (Ed.), *Digital games in language learning and teaching* (pp. 32-49). Basingstoke: Palgrave Macmillan.

Rico García, M. M., & Agudo Garzón, J. E. (2016). Aprendizaje móvil de inglés mediante juegos de espías en Educación Secundaria [Mobile English language learning through spy games in secondary education]. *RIED. Revista Iberoamericana de Educación a Distancia, 19*(1). Retrieved from http://www.redalyc.org/resumen.oa?id=331443195007

Searle, J. R. (1979). *Expression and meaning: Studies in the theory of speech acts*. Cambridge: Cambridge Univ. Pr.

Soleimani, E., Ismail, K., & Mustaffa, R. (2014). The acceptance of mobile assisted language learning (MALL) among post graduate ESL students in UKM. *Procedia - Social and Behavioral Sciences*, *118*(Supplement C), 457–462. https://doi.org/10.1016/j.sbspro.2014.02.062

The CEFR Levels. (n.d.). Retrieved April 11, 2018, from https://www.coe.int/en/web/common-european-framework-reference-languages/level-descriptions

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole & S. Scribner, Eds.). Cambridge, MA: Harvard University Press.

Wood, R. T., Griffiths, M. D., Chappell, D., & Davies, M. N. (2004). The structural characteristics of video games: a psycho-structural analysis. CyberPsychology & Behavior, 7(1), 1-10. doi:10.1089/109493104322820057

Appendices

Appendix 1: Rubric

Category	Sub-Category	4	3	2	1	0
Game Design	Consequence Reduction	Consequence within the game if learner makes a linguistic, pragmatic or other type of error is **significantly reduced** compared to what might occur in real life.	Consequence within the game if learner makes a linguistic, pragmatic or other type of error is **mostly reduced** compared to what might occur in real life.	Consequence within the game if learner makes a linguistic, pragmatic or other type of error is **partially reduced** compared to what might occur in real life.	Consequence within the game if learner makes a linguistic, pragmatic or other type of error is **slightly reduced** compared to what might occur in real life.	Consequence within the game if learner makes a linguistic, pragmatic or other type of error is **not reduced** compared to what might occur in real life.
	Character Development	**Abundant** opportunities for learner to interact and make choices within the game environment.	**Many** opportunities for learner to interact and make choices within the game environment.	**Some** opportunities for learner to interact and make choices within the game environment.	**Few** opportunities for learner to interact and make choices within the game environment.	**No** opportunities for learner to interact and make choices within the game environment.
	Pleasantly Challenging	Puzzles, language level and story line are **almost always** a little harder than the current abilities of the learner.	Puzzles, language level and story line are **most of the time** a little harder than the current abilities of the learner.	Puzzles, language level and story line are **sometimes** a little harder than the current abilities of the learner.	Puzzles, language level and story line are **rarely** a little harder than the current abilities of the learner.	Puzzles, language level and story line are **never** a little harder than the current abilities of the learner.
	Learning Preferences	**Abundant** opportunities to receive information in more than one way.	**Many** opportunities to receive information in more than one way.	**Some** opportunities to receive information in more than one way.	**Few** opportunities to receive information in more than one way.	**No** opportunities to receive information in more than one way.
Language Learning Principles	Input/Output	**Abundant** ways to interact with linguistic input and produce linguistic output.	**Many** ways to interact with linguistic input and produce linguistic output.	**Some** ways to interact with linguistic input and produce linguistic output.	**Few** ways to interact with linguistic input and produce linguistic output.	**No** ways to interact with linguistic input and produce linguistic output.
	Focus on Meaning	**Abundant** opportunities to complete tasks based on understanding of linguistic input.	**Many** opportunities to complete tasks based on understanding of linguistic input.	**Some** opportunities to complete tasks based on understanding of linguistic input.	**Few** opportunities to complete tasks based on understanding of linguistic input.	**No** opportunities to complete tasks based on understanding of linguistic input.
	Sociolinguistic Exposure	**Abundant** exposure to a variety of sociolinguistic features such as dialect, register, figures of speech and fillers.	**Decent** exposure to sociolinguistic features such as dialect, register, figures of speech and fillers.	**Some** exposure to sociolinguistic features such as dialect, register, figures of speech and fillers.	**Minimal** exposure to sociolinguistic features such as dialect, register, figures of speech and fillers.	**No** exposure to sociolinguistic features such as dialect, register, figures of speech and fillers.
	Pragmatic Feedback	**Abundant** opportunities to receive pragmatic feedback from NPCs and game functions.	**Many** opportunities to receive pragmatic feedback from NPCs and game functions.	**Some** opportunities to receive pragmatic feedback from NPCs and game functions.	**Few** opportunities to receive pragmatic feedback from NPCs and game functions.	**No** opportunities to receive pragmatic feedback from NPCs and game functions.
Technical Criteria	Usability	Meets 4 of the following: • very rarely crashes, • has very few bugs, • is usable on many different devices and at least 2 operating systems • is updated regularly • operations are intuitive	Meets 3 of the following: • very rarely crashes, • has very few bugs, • is usable on many different devices and at least 2 operating systems • is updated regularly • operations are intuitive	Meets 2 of the following: • very rarely crashes, • has very few bugs, • is usable on many different devices and at least 2 operating systems • is updated regularly • operations are intuitive	Meets 1 of the following: • very rarely crashes, • has very few bugs, • is usable on many different devices and at least 2 operating systems • is updated regularly • operations are intuitive	Meets none of the following: • very rarely crashes, • has very few bugs, • is usable on many different devices and at least 2 operating systems • is updated regularly • operations are intuitive
	Visually and Aurally Pleasing	**Abundant** realistic sound effects and high-quality realistic graphics and/or animations.	**Many** realistic sound effects and high-quality realistic graphics and/or animations.	**Some** sound effects and high-quality graphics and/or animations that may not be realistic.	**Few** sound effects, graphics and/or animations that may not be high quality or realistic.	**No** sound effects or graphics or animations.

Appendix 2: Gee's 36 Game Design Principles

From *What Video Games Have to Teach Us About Learning and Literacy*, by James Paul Gee, 2007, pp. 221-227. Principles integrated in rubric categories are **bold,** and principles that have been left out of rubric categories are in *italics.*

1. Active, Critical Learning Principle	*All aspects of the learning environment (including ways in which the semiotic domain is designed and presented) are setup to encourage active and critical, not passive, learning.*
2. Design Principle	*Learning about and coming to appreciate design and design principles is core to the learning experience.*
3. Semiotic Principle	*Learning about and coming to appreciate interrelations within and across multiple sign systems (images, words, actions, symbols, artifacts, etc.) as a complex system is core to the learning experience.*
4. Semiotic Domains Principle	*Learning involves mastering, at some level, semiotic domains, and being able to participate, at some level, in the affinity group or groups connected to them.*
5. Metalevel Thinking about Semiotic Domains Principle	*Learning involves active and critical thinking about the relationships of the semiotic domain being learned to other semiotic domains.*
6. "Psychosocial Moratorium" Principle	**Learners can take risks in a space where real-world consequences are lowered.**
7. Committed Learning Principle	**Learners participate in an extended engagement (lots of effort and practice) as an extension of their real-world identities in relation to a virtual identity to which they feel some commitment and a virtual world that they find compelling.**
8. Identity Principle	**Learning involves taking on and playing with identities in such a way that the learner has real choices (in developing the virtual identity) and ample opportunity to meditate on the relationship between new identities and old ones. There is a tripartite play of identities as learners relate, and reflect on, their multiple real-world identities, a virtual identity, and a projective identity.**
9. Self-Knowledge Principle	**The virtual world is constructed in such a way that learners learn not only about the domain but about themselves and their current and potential capacities.**

10. Amplification of Input Principle	**For a little input, learners get a lot of output.**
11. Achievement Principle	**For learners of all levels of skill there are intrinsic rewards from the beginning, customized to each learner's level, effort, and growing mastery and signaling the learner's ongoing achievements.**
12. Practice Principle	**Learners get lots and lots of practice in a context where the practice is not boring (i.e. in a virtual world that is compelling to learners on their own terms and where the learners experience ongoing success). They spend lots of time on task.**
13. Ongoing Learning Principle	**The distinction between learner and master is vague, since learners, thanks to the operation of the "regime of competence" principle listed next, must at higher and higher levels, undo their routinized mastery to adapt to new or changed conditions. There are cycles of new learning, automization, undoing automization, and new reorganized automatization.**
14. "Regime of Competence" Principle	**The learner gets ample opportunity to operate within, but at the outer edge of, his or her resources, so that at those points things are felt as challenging but not "undoable."**
15. Probing Principle	*Learning is a cycle of probing the world (doing something), reflecting in and on this action and, on this basis, forming a hypothesis; reprobing the world to test this hypothesis; and then accepting or rethinking the hypothesis.*
16. Multiple Routes Principle	**There are multiple ways to make progress or move ahead This allows learners to make choices, rely on their own strengths and styles of learning and problem solving, while also exploring alternative styles.**
17. Situated Meaning Principle	**The meanings of signs (words, actions, objects, artifacts, symbols, texts, etc.) are situated in embodied experience. Meanings are not general or decontextualized. Whatever the generality meanings come to have is discovered bottom up via embodied experiences.**
18. Text Principle	**Texts are not understood purely verbally but are understood in terms of embodied experiences. Learners move back and forth between texts and embodied experiences. More purely verbal understanding comes only when learners have had enough embodied experience in the domain and ample experiences with similar texts.**
19. Intertextual Principle	*The learner understands texts as a family ("genre") of related texts and understands any one such text in relation to others in the family, but only after having achieved embodied understandings of some texts. Understanding a group of texts as a family of texts is a large part of what helps the learner make sense of such texts.*

20. Multimodal Principle	**Meaning and knowledge are built up through various modalities (images, texts, symbols, interactions, abstract design, sound, etc.) not just words.**
21. "Material Intelligence" Principle	**Thinking, problem solving, and knowledge are stored in tools, technologies, material objects, and the environment. This frees learners to engage their minds with other things while combining the results of their own thinking with the knowledge stored in these tools, technologies, material objects, and the environment to achieve yet more powerful effects.**
22. Intuitive Knowledge Principle	**Intuitive or tacit knowledge built up in repeated practice and experience, often in association with an affinity group, counts a great deal and is honored. Not just verbal and conscious knowledge is rewarded.**
23. Subset Principle	*Learning even at its start takes place in a (simplified) subset of the real domain.*
24. Incremental Principle	**Learning situations are ordered in the early stages so that earlier cases lead to generalizations that are fruitful for later cases. When learners face more complex cases later, the hypothesis space is constrained by the sorts of fruitful patterns or generalizations the learner has found earlier.**
25. Concentrated Sample Principle	*The learner sees, especially early on, many more instances of fundamental signs and actions than would be the case in a less controlled sample. Fundamental signs and actions are concentrated in the early stages so that learners get to practice them often and learn them well.*
26. Bottom-up Basic Skills Principle	**Basic skills are not learned in isolation or out of context; rather, what counts as a basic skill is discovered bottom up by engaging in more and more of the game/domain or game/domains like it. Basic skills are genre elements of a given type of game/domain.**
27. Explicit Information On-Demand and Just-in-Time Principle	**The learner is given explicit information both on demand and just in time, when the learner needs it or just at the point where the information can be best understood and used in practice.**
28. Discovery Principle	**Overt telling is kept to a well-thought-out minimum, allowing ample opportunity for the learner to experiment and make discoveries.**
29. Transfer Principle	**Learners are given ample opportunity to practice, and support for, transferring what they have learned earlier to later problems, including problems that require adapting and transforming that earlier learning.**

30. Cultural Models about the World Principle	**Learning is set up in such a way that learners come to think consciously and reflectively about some of their cultural models regarding the world, without denigration of their identities, abilities, or social affiliations, and juxtapose them to new models that may conflict with or otherwise relate to them in various ways.**
31. Cultural Models about Learning Principle	**Learning is set up in such a way that learners come to think consciously and reflectively about their cultural models of learning and themselves as learners, without denigration of their identities, abilities, or social affiliations, and juxtapose them to new models of learning and themselves as learners.**
32. Culture Models about Semiotic Domains Principle	*Learning is setup in such a way that learners come to think consciously and reflectively about their cultural models about a particular semiotic domain they are learning, without denigration of their identities, abilities, or social affiliations, and juxtapose them to new models of learning and themselves as learners.*
33. Distributed Principle	**Meaning/knowledge is distributed across the learner, objects, tools, symbols, technologies, and the environment.**
34. Dispersed Principle	*Meaning/knowledge is dispersed in the sense that the learner shares it with others outside the domain/game, some of whom the learner may rarely or never see face to face.*
35. Affinity Group Principle	*Learners constitute and "affinity group," that is, a group that is bonded primarily through shared endeavors, goals and practices and not shared race, gender, nation, ethnicity, or culture.*
36. Insider Principle	*The learner is an "insider," "teacher," and "producer" (not just a "consumer") able to customize the learning experience and domain/genre from the beginning and throughout the experience.*

Appendix 3: Ellis's 10 Second Language Instruction Principles

From Ellis (2008). Principles related to a rubric category are **bold,** others are in *italics*.

Principle 1: Instruction needs to ensure that learners develop both a rich repertoire of formulaic expressions and a rule-based competence.

Principle 2: Instruction needs to ensure that learners focus predominantly on meaning.

Principle 3: Instruction needs to ensure that learners also focus on form.

Principle 4: Instruction needs to focus on developing implicit knowledge of the second language while not neglecting explicit knowledge.

Principle 5: Instruction needs to take into account the learner's built-in syllabus.

Principle 6: Successful instructed language learning requires extensive second language input.

Principle 7: Successful instructed language learning also requires opportunities for output.

Principle 8: The opportunity to interact in the second language is central to developing second language proficiency.

Principle 9: Instruction needs to take account of individual differences in learners.

Principle 10: In assessing learners' second language proficiency, it is important to examine free as well as controlled production.