

Developing user-centered video game concepts for language learning

Yorick Poels, Jan-Henk Annema, Bieke Zaman
 Centre for User Experience Research (CUO)
 K.U.Leuven / IBBT Future Health Department
 Leuven, Belgium
 {yorick.poels, janhenk.annema,
 bieke.zaman}@soc.kuleuven.be

Frederik Cornillie
 Interdisciplinary Research on Technology, Education &
 Communication (iTec)
 K.U.Leuven / IBBT Future Health Department
 Kortrijk, Belgium
 frederik.cornillie@kuleuven-kortrijk.be

Abstract — This paper will report on an ongoing project which aims to develop video games for language learning through a user-centered and evidence-based approach. Therefore, co-design sessions were held with adolescents between 14 and 16 years old, in order to gain insight into their preferences for educational games for language learning. During these sessions, 11 concepts for video games were developed. We noticed a divide between the concepts for games that were oriented towards formal language learning (e.g. exercises on vocabulary) and video games that were centered around communication with other players or in-game characters.

Keywords - co-design, user-centered, games, language learning.

I. INTRODUCTION

Nowadays, video games are no longer designed solely for entertainment purposes. The resurged interest in serious games shows that many areas can benefit from the engaging experience that video games offer. For instance, video games have been designed to help people in various therapeutic contexts [8, 27], as well as for explicitly educational purposes [21, 22, 26]. In the field of Computer-Assisted Language Learning (CALL), games have been developed specifically for language instruction [12, 13, 20], and have, to a more limited extent and much more recently, been subjected to empirical research [4, 14, 18, 24].

One reason why games may be particularly suited for language learning is that many aspects of video games, for instance problem/puzzle solving and scoring, are also present in language learning [16].

On a broader level, language fulfills a meaningful role in games so that players have to use it as a resource to advance in the game, which resembles the way language is used in functional approaches to language teaching [7, 17]. For instance, in many games language plays an important role in the interaction between the user and the game, e.g. through game scripts and in-game dialogues, and players need to comprehend and/or use language in order to approach goals which are meaningful for them. Also, with the recent rise of massively multiplayer online games (MMOGs), language is a crucial means of communication between players of different linguistic and cultural backgrounds, who need to communicate effectively in order to achieve collaborative goals [25].

It may be argued that precisely because of this apparently natural link between games in which dialogue, narrative and

communication play a significant role and the currently predominant pedagogical focus on functional approaches to language instruction, little research has been devoted to mini-games. Mini-games are small, self-contained games which usually take a short amount of time to complete and which focus on a specific topic [6]. Mini-games are ubiquitous, and have been developed for several purposes, such as for education [6], to offer distraction, [15, 23] and as part of regular video games, for example, small puzzles or simple sports mini-games that are embedded in the Final Fantasy RPG series [23]. In contrast to video games that have traditionally been developed for personal computers and gaming consoles, mini-games can also be found on mobile phones and the web.

Due to their relatively limited size and complexity, mini-games are less expensive, which is an advantage considering the limited budgets of serious games. Furthermore, mini-games can be easily reused in other contexts. This might make them particularly suitable for formal language instruction, especially for explicit vocabulary and grammar training, which often feature short and repetitive exercises. However, little is yet known about how language learners might respond to such games, apart from the fact that learners from a difficult socio-cultural background seem to prefer them over fully immersive games [10].

If it were not challenging enough to design full video games for foreign language instruction that are both effective in terms of language acquisition and at the same time are motivating [17], designing mini-games explicitly for foreign language teaching is probably even more of an ordeal. It is conceivable that from the perspective of a learner/player, certainly if (s)he plays voluntarily, gaming is an end in itself rather than a vehicle to learn a language [11]. Hence, language learning exercises should not merely be disguised as a game, but integrated as part of a game that is fun to play. As a result, it is mainly whether the learner perceives an educational (mini-)game as a game that determines it will be used as such, not what teachers or instructional designers intend to do with it. Primarily, players should want to play the game for pleasure instead of for other reasons.

However, what is needed to create a language learning game that delivers a foremost fun and engaging experience remains unclear. For the design of educational mini-games, this is complicated by the fact that in mini-games the focus is on language as a formal system, which might be less

motivating than when the focus is on language as communication. This underlines the need for a user-centered approach in designing such games.

Therefore, in the study reported in this paper, we set out to examine what it is that makes a game for language learning engaging and something the learners want to play for the sake of fun alone. The study specifically focused on second language learning for adolescents and the needs of these learners concerning fun and engaging educational games for language learning.

Discovering needs of the learner: co-design

To design an engaging game experience, it is essential to understand the needs of the people who will play the game in the future. Sanders [19] describes three perspectives from which a person’s experience can be explored.

The first perspective is to listen to what people say and think by using methods from the market research field such as questionnaires, focus groups and interviews. However, by only listening to what people say, important information is missed. People often forget essential details when explaining their day to day business to others and do not know what information is important for the design process [9].

The second perspective is to look at what people do. Different methods from the user-centered design field can be used to observe what people do and use. This way, more insight can be gained into the details of what people do, how they do it, and, for instance, how their environment restricts them in what they do [9].

However, to create a game that is truly engaging, it is necessary to also understand what people know, feel, and what they dream of. This information is hard to uncover as it may not readily be expressed in words, or cannot be observed as it might, for instance, be about latent needs. One way for researchers and designers to get insight into these aspects of experience, Sanders [19] argues, is to have people expressing their thoughts, feelings, and dreams by making artifacts (see Figure 1).

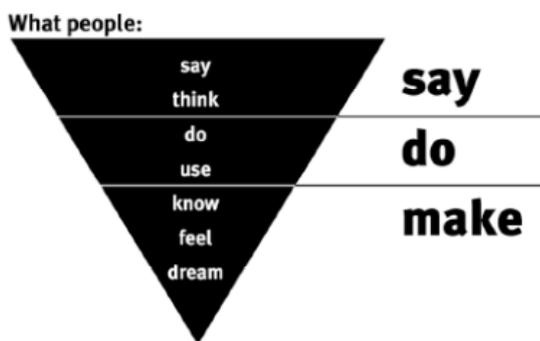


Figure 1. Sanders: “Ways we can learn from people” [19]

One way to do this is through co-design sessions in which users create things together with designers and

researchers. By exploring ideas and concepts together and by making and evaluating artifacts, users communicate directly with the designers and researchers. The artifacts that are made can be considered low fidelity prototypes of the future application. Co-design is a method to gain insight into the participants’ ideas and point of views on certain topics, language learning in games for instance, through the use of a creative process. The results should not be regarded as finished designs. Nonetheless, for social scientists and human computer interaction researchers, co-design can be a real valuable asset in discovering the needs of end-users.

In order to gain as much as possible from co-design it has been found that creating multiple prototypes is more effective than creating a single prototype. A study by Dow et al. [5] showed that when it comes to the design outcomes, exploration, sharing, and group rapport, creating multiple prototypes was the better option.

II. METHOD

A. Participants

A total of fourteen adolescents participated in the study. Two sessions were held. One session in the forenoon, which consisted of eight participants, and one afternoon session, in which 6 adolescents participated. All participants were between 14 and 16 years of age, only one of the fourteen participants was a girl. Twelve of the participants were in general secondary education (called ASO in Belgium), while two participants were from the technical secondary education (TSO). The participants were recruited through online forums, electronic newsletters, paper flyers and posters.

The eight participants of the first session played on average 41 minutes a day. Two of these participants stated that they never played videogames, while four played games more than one hour a day. The six participants of the second session played on average 1 hour 35 minutes. Two of the six participants played three to four hours a day, while the others played more on weekend days.

B. Procedure

Two sessions were held; each session lasted approximately three hours. Each session consisted of an introduction round, a group discussion, a game design round, and a concluding group discussion. This procedure was selected to follow the typical cognitive process of creativity as closely as possible. This process is typically divided into four or five different stages [1, 2, 3].

1) *Introductory round*

Using a slideshow presentation the topic at hand and the co-design methodology were explained briefly to the participants. Then, examples from previous co-design sessions were presented. These examples were taken from domains other than language learning, in order to prevent possible biasing the creative thinking of the participants. The introduction took around 15 minutes.

2) *Group discussion*

After the introduction the participants were split into two groups consisting of three or four participants. Two researchers joined each group and started a short moderated group discussion, in which current language learning practices, both formal and informal, as well as their general experience with learning through games were addressed. This group discussion was intended as a ‘sensitizing activity’, which is a typical first stage in a creative process. This group discussion lasted 20 minutes.

3) *Game design round*

Each group was asked to come up with three game concepts and created low fidelity paper prototypes of these concepts using the available materials (see Figure 2). The participants got one hour to create the three prototypes. The prototypes by no means had to be complete designs.

No explicit instructions were given whether the participants had to create mini games or regular video games. We did not want to limit the participants to only develop mini games, in order to provide them with an opportunity to think freely about games for language learning. However, when a group of participants had come up with two concepts that were clearly regular video games instead of mini-games, the researchers stimulated the participants to make their third design a mini game.

When looking at the different stages of the creative process [19], this round resembled the third stage, inspiration. In this stage, possible solutions or new insights typically occur. The second stage, incubation, was not present in our study due to practical concerns, as the sessions were scheduled on one day.



Figure 2. Creating a video game prototype

4) *Group discussion / interview*

After the game design round, the two groups of participants were asked to present their prototypes to each other and the researchers (see Figure 3). The participants in the other group could ask questions, comment on the prototypes, and had to pick the best design in their opinion. The researchers asked questions to clarify the design choices. After both groups had presented their prototypes, a group discussion was started that revolved around a number of pre-defined topics such as user-oriented and personal goals within the

game, the role of the teacher, context and the use of the video game.

The group discussion can be seen as an activity that represents the final stage, transformation, in a creative process [2]. An evaluation takes place during the transformation stage, to decide whether an idea is valuable. The ideas are elaborated upon to validate and communicate them with the rest of the group. This discussion took about an hour.



Figure 3. Prototype presentation and group discussion

III. RESULTS

The created game concepts were varied and demonstrated a range of elaborateness. Some concepts were original, whilst other concepts adhered more to generally known game concepts or game genres. In general, two major categories could be discerned. On the one hand, games that were focused on formal learning, the principle of language learning with, for example, vocabulary exercises. On the other hand, game concepts were created that used language as a means of communication. In the following two sections, we will give an overview of these two categories.

A. *Games for formal language learning*

Three of the game designs that were created, were aimed towards formal language learning. These games shared the following characteristics: focus on vocabulary, immediate feedback, limited time requirement, and little or no narrative.

These characteristics will be outlined based on one of the game prototypes that was developed, the cannon-versus-monsters game (see Figure 4). In this game, the player has to translate a word as quick as possible in order to prevent monsters, descending on a narrow path, to reach the player. The number of bullets a player receives depends on the length of the assigned word. For instance, a four letter word that is correctly translated gives the player four bullets to eliminate the approaching monsters (see Figure 4). The difficulty level gradually rises with each stage, offering the player more challenging words to translate, but also offering

more bullets and useful power-ups (any item that temporarily gives a character new abilities, new powers, or a statistical bonus).

As said above, three of the game concepts focused on vocabulary. In the cannon-versus-monsters game, for instance, the goal is to survive as long as possible by correctly translating words. In the other two game concepts, vocabulary also is the main language learning topic, as players have to translate words, recognize words or associate them with other words.

Feedback in the cannons-versus-monsters game is provided immediately to the player. Every time the player fails to translate a word, the monsters come closer to the player's home, eventually destroying it when the monsters come near enough. Thus, it is obvious that it is crucial that as many words as possible are translated correctly. When the player fails to translate a word, the consequences are instantly visible as the monsters further approach the onscreen character of the player. In the other two game concepts focusing on vocabulary, players also instantly lose a live or turn when making a mistake.

The cannon-versus-monster game revolves around the relatively simple goal of keeping the monster away. By translating words correctly ammunition is earned that can be used to shoot the monsters. No further narrative or plot was provided as context for the game. This characteristic was shared by the other two game concepts that focused on vocabulary. These games had a very limited, if not, non-existent story line.

Finally, as the cannon-versus-monsters game concept and the other two game concepts focusing on vocabulary were relatively simple and short games, they did not require a lot of time to complete. Thus, these games could easily be played in situations where little time is available. Participants commented in the group discussion that because of this, the games could be used at school as part of language learning classes.



Figure 4. Drawing of the cannon-versus-monsters game concept

B. Games and language as communication

Six of the games concepts could be characterized by their focus on language as a means to communicate in the game.

Players needed to communicate to progress through the game. When compared to the three game concepts that focused on vocabulary, these concepts were more complex and contained an elaborate narrative, provided less immediate feedback, and were more time consuming. These characteristics will be discussed by looking at one of these six games concepts, an adventure game, in more detail.

In this adventure game, the player has to get from Paris, France, to Los Angeles, USA, to visit his sick mother. To achieve this, the player has to communicate with other game characters or other non-player characters. Thus, language is the means to get to the end goal. Through dialogues and creative use of language (e.g. asking for a lift, lure opponents into traps, persuasion, deceiving, ...), the game character progresses through the game.

The game concepts that focus on communication were more elaborate than the game concepts that focused on vocabulary. While the vocabulary game concepts contained no or very little narrative, whereas the narrative was very important, and much richer, in the games focusing on communication.

A consequence of the focus on communication and the related, more elaborate, narrative is that the feedback is less immediate than in the games that focus on vocabulary. While in the cannon-versus-monsters game, the player immediately receives bullets to keep the monsters away, or sees the monsters approaching further after each mistake, the progress in the games focusing on communication is less immediately visible. Although the end goal is clear, the player only slowly approaches this goal; the rewards lie on a higher level.

Finally, compared to the games focusing on vocabulary, the game concepts with a focus on communication are relatively complex and therefore required more time to play. The player has to have a period of uninterrupted time available to play. This would make these games, according to our participants in the group discussion, more suited for playing at home.

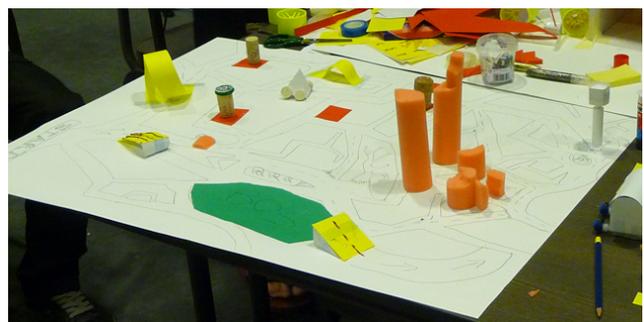


Figure 5. Free roaming game

C. General characteristics

Based on the game concept prototypes, we could discern a number of general characteristics for the games developed by our participants. Four of the eleven games had a multiplayer mode. In a number of games, this feature was

not explicitly mentioned, and was open for interpretation. Six of the games incorporated a social component, like the ability to share high scores with friends, and communicate via voice chat.

The choice of the platform (computer, console, mobile) was not specified for most game concepts. Some games were thought to be more suited for a specific platform than others, with game concepts ranging from a traditional mini-game on a desktop computer, to an augmented reality game on a mobile phone.

Concerning reward mechanisms, different concepts were developed by the participants. This ranged from simple scoring systems, e.g. traditional high scores, to more complex rewarding mechanisms, where the player could gain experience points on different levels.

D. Context – instruction – in game feedback

The context where one could play a game differed also between the various games. Three games were found to be more suitable by the participants for home and school usage. One game they would rather like to play in a home context. For the majority of game concepts, the participants did not define the ideal playing context.

The participants also indicated that in-game feedback mechanisms were of certain importance. They found it important that there is a kind of feedback present in games, for example when the player is stuck. Feedback mechanisms varied from a built-in translator to an in-game character that aided the player as an interpreter for foreign languages.

IV. DISCUSSION

This study indicated that there is a divide in games for language learning. On the one hand, our participants developed games for formal language learning that resembled the definition of a mini-game [6]. On the other hand, we discerned games that focused on language as communication. Nevertheless, we were surprised to see that none of the games focusing on formal language learning dealt with grammar.

As we already pointed out, some games were more focused on learning vocabulary, formal learning, while the other games were based around communication. This finding is not necessarily a disadvantage for the design of educational games for language learning, but confirms that games could be used as a medium to create a need for the language learner to accomplish objectives that lie outside the language itself. We could use the game concepts that were developed to identify these needs and incorporate them in an additional layer around the games.

Our study posed a number of limitations. First, there was the sample that consisted mostly of adolescents of the same school level (general secondary education). As our study had no intention to generalize these results to a larger population (all school levels), the limited sample did not pose a threat for the explorative nature of our study. The participants were mainly male adolescents. We suspect that they were more prone to react to our message. We did, however, spread the recruitment message via numerous channels, online as well

as offline (posters and flyers in schools, public library) in order to prevent overrepresentation of certain groups (hardcore gamers, tech savvy boys). However, there still was more reaction from adolescents from the ASO, and also more from boys.

Second, we noticed that the participants created games or game concepts that, sometimes, resembled existing games. This could point in different directions, namely that our participants had played a lot of commercial titles and were influenced by these concepts, or that they had little imagination and therefore copied existing games. Future research could link the participants' gaming history and preexisting preferences to the creation of game concepts in co-design sessions.

And finally, from a game design point of view, co-design is not an ideal method for developing fully finished games. Co-design is a method for researchers to gain insight into the participants' needs and experiences concerning language learning in games. Nonetheless, for social scientists or human computer interaction researcher, co-design can be a valuable asset in discovering the needs of end-users, through a creative process.

V. CONCLUSION

In sum, the results of this co-design study revealed insights into game concepts for the design of video games for language learning, from a user centered design perspective. These insights can be interesting for the development of language learning games.

We noticed a divide between the concepts for mini-games, that were oriented towards formal language learning (e.g. exercises on vocabulary) and video games that were based around communication with others (players or in-game characters).

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