

Acceptance evaluation of a serious game to address gender stereotypes in Mexico

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Abstract. Serious Games provide an opportunity to address social issues in an interactive environment particularly appealing for school-aged children. Gender stereotypes are one of the many remaining gender-related issues in current society. Stereotypes appear at early ages and are particularly prevalent in certain cultures and countries. This paper presents an early acceptance evaluation of Kiddo, a serious game to address gender stereotypes in Mexico. The game has been designed to address four of the main stereotypes still present in children in this country, and it is intended to be used in classes by teachers to start a discussion about gender stereotypes. The evaluation has been carried out with a prototype of the game containing one of the game chapters and a sample including teachers and gender experts. The goal is to verify both the usability of the game as well as its acceptance for some of the target users that will later apply the game in their classes. Results of both usability and acceptance questionnaires have provided a useful insight into the strengths and areas of improvement for the game, and they are being incorporated into the new version of Kiddo.

Keywords: Serious Games, Videogame, Gender Stereotypes, Technology-Enhanced Learning.

1 Introduction

1.1 Serious Games

Serious Games (SGs) are games that have a main purpose other than entertainment, enjoyment, or fun [1]. Among their purposes, it stands out increasing awareness, teaching knowledge, or changing behavior. The highly interactive environment that they provide allows many possibilities for affecting their players, including immersive learning experiences to apply their knowledge, and/or test complex scenarios in a safe environment. Due to these characteristics, SGs have been applied in different domains with promising results, including applications in the health field and to address social problems [2].

To date, serious games are becoming widely used in the research community. These games are promising tools thanks to the engagement between stakeholders, the potential for interactive visualization, the capacity of developing and improving social learning and teaching decision making skills [3]. Although serious videogames are not new, their expansion has been taking place since 2010. Researchers suggest that the characteristics of serious videogames should establish clear learning objectives for students, provide continuous feedback on their progress, and their difficulty should be adapted to the learner's capabilities, as well as adding surprise elements to break the monotony of the videogame [4].

This article describes the process of creation and acceptance of Kiddo, a videogame to educate in gender equality. A pilot chapter was created and evaluated, looking for areas of opportunity before completing the videogame and launching it to the public.

1.1 Gender stereotypes

One of the remaining gender-related issues in current society is the prevalence of several gender stereotypes. The United Nations' Office of the High Commissioner for Human Rights defines a gender stereotype as "a generalized view or preconception about attributes or characteristics, or the roles that are or ought to be possessed by, or performed by, women and men" [5]. These preconceptions limit individuals' development and choices and perpetuate inequalities. In certain cultures and countries, the presence of gender stereotypes is particularly striking. Such is the case of Mexico, where different reports have studied the prevalence and normalization of gender stereotypes in general society, as part of the cultural background [6], and its direct relation with sexist and gender stereotypes in primary and secondary students. Some of these reports highlight the most common stereotypes in Mexico's children [7], summarized in **Table 1**.

Table 1. Main results of questionnaire applied to a representative sample of Mexico's 6th grade primary school children (adapted from the original, in Spanish [7])

Gender stereotype	% of boys who agree	% of girls who agree
Boys do need to finish school and prepare themselves to maintain their future home.	85.7	82.0
Girls should learn to help out at home by taking care of their siblings and doing the cleaning up.	78.8	78.9
The man is the one who should have the greatest responsibility for bringing money into the home.	77.3	75.2
Girls should play with dolls.	75.2	71.7
Boys should play soccer and other hard-core sports.	70.8	62.8
The woman is the one who has to be careful not to become pregnant.	67.1	69.6

Gender stereotypes appear very early in children's development, so it is essential to address them at a young age. This happens to be especially noticeable in Latin American culture. In a study [8] aimed to determine the role and level of involvement of Latin American mothers in their children's math learning, the results showed that the mother's attention regarding their daughter's math learning, decreased overtime, especially during 5th and 6th grade, a situation paired with statements such as "math is more useful for boys". Another study [9] carried out with younger children mentions that mothers of children around 2 years of age use language related to numbers (initial mathematical approach) up to 3 times more with boys than with girls. As a result, at early school ages, the stereotype that "girls are better at reading and boys are better at mathematics" is reinforced. Although, as mentioned, this is a stereotype, it causes frustration on both sides: on the girls for "not being as good" and on the boys who have difficulties with mathematics for "not being as good as the other boys".

2 Related work

Serious Games have been used to address gender issues, such as violence or abuse. Examples of this are Tsiunas [10], a game to understand essential elements for the prevention of gender-based violence and the promotion of responsible masculinities, and Jesse [11], an adventure game set in the Caribbean region that deals with domestic violence. Other examples of gender focused videogames are Berolos [12] (Spain) and Iguala-t [13] (Spain). Some of these games have academic evaluations that measure their effectiveness, most of them being successful tools that, from their approach, help to counteract gender problems. There are three main approaches that most of these games tend to use:

- Games for girls are built over gender differences and promote different concepts of femininity.
- Games for change have the approach to create awareness regarding sexism and gender stereotypes.
- Creative games are developed mostly for girls, encouraging girls to create and develop their own learning conditions and surroundings. Widely used in STEM projects focused on bringing girls closer to sciences [14].

In a review of games addressing gender-related issues [15], results showed that stereotypes were barely mentioned. Only the videogame Chuka [16], developed by The United Nations Office against Drugs and Crime (UNODC) in Mexico, included gender stereotypes as one of the topics addressed in the game.

Results also showed the limitations of the games addressing gender issues: the lack of evaluation studies to prove their effectiveness, the lack of follow-up to measure their long-term effect and the lack of participants or contrast with teachers or educators who can apply the games in their classes. Despite these limitations, serious games provide multiple advantages, one of the most relevant ones being the possibility to include analysis of player interactions. This allows to study the data collected by the game, with the

objective of informing us if there are changes with respect to the perception of the problem presented to the users, before and after applying a game, videogame or simulation in which they suffer some discrimination or confrontation regarding gender stereotypes.

3 Kiddo

Kiddo is a narrative and decision making or “game thinking” videogame to address gender stereotypes for school-aged children (7-13 years old). Kiddo seeks to make the most common gender stereotypes visible to educate in equality. The story takes place in common scenarios in a child’s development: school, home, park, etc. The main characters of the game are two twins (a boy and a girl) who will encounter situations related to gender stereotypes that they must overcome without hurting themselves or the other twin. In these scenarios, the twins Juan and María (see **Fig. 1**) will engage in conversations and interactions with other characters (NPC/non-playable) within the game. The game will have a mood bar, where players will be able to observe how the character feels about the decisions made.



Fig. 1. Screenshot of Kiddo showing the twins (left) and the scenarios of the game (right).

Players play in third-person perspective, achieving immersion in the game through elements such as narrative, character design and the use of common environments for viewers, which can help increase empathy and closeness in a player. The game contains 4 chapters (see **Fig. 2**) addressing different gender stereotypes:

1. Colors: “Blue is for boys and pink is for girls”
2. Educational: “Boys are better at math and girls are better at arts”
3. Physical activities: “Some sports are for girls and some are for boys”
4. House activities and responsibilities: “Domestic chores are only for girls”

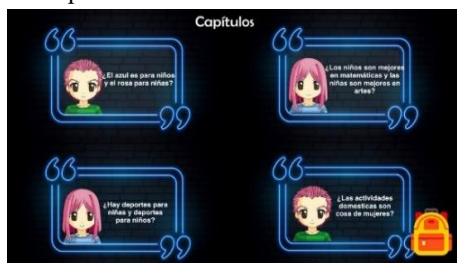


Fig. 2. Screenshot of Kiddo’s twins and gameplay with four available chapters.

Each chapter is designed to last around 5 minutes, so the whole game, including any pre-game and post-game interventions, can be played in a single class hour. In two of the chapters (colors and domestic chores), players will make decisions affecting Juan (the twin boy), while in the other two chapters (educational and physical activities), the choices made by the players will affect María (the twin girl).

3.1 Design and development

The design of Kiddo was based on the review of previous literature regarding serious games and gender stereotypes, as well as on the analysis of multiple games to address gender-related issues and other social issues. The common characteristics and mechanics of such games helped the early design of Kiddo.

The first chapter of Kiddo was subjected to two types of early testing: the first was conducted by four serious game experts of the research group, each researcher playing the game independently, and all of whom had not participated in the design and/or development of the game. Their comments and suggestions were analyzed and revised to improve several aspects of the chapter, including: the design of some items and NPCs, the dialogues in some conversations, a better description of the gender stereotypes addressed, and some other minor suggestions that were incorporated. The second test was carried out by external participants: teachers, students, parents, videogame players and non-video game players, with the purpose of contrasting the design of Kiddo, and evaluating its acceptance and usability for target users (particularly teachers) and gender experts, obtaining as many constructive comments as possible to improve Kiddo's early development.

Kiddo has been developed using uAdventure [17], a framework built on top of Unity to design educational videogames. uAdventure simplifies game development by abstracting the main narrative elements of "point and click" adventure games (e.g., scenarios, characters, conversations) into a simplified, easy-to-understand model, allowing non-expert game developers to focus on the features they need. uAdventure further incorporates default Game Learning Analytics [18] that allows to collect traces from all player-related events (e.g., interactions with game elements and NPCs; scene changes; start, ending and choices in conversations; and changes in game-state variables). This incorporated Learning Analytics will be essential in the subsequent validation of the final version of Kiddo when tested with students. Due to uAdventure multiplatform features, Kiddo's final version will be available for several platforms, currently including PC (Windows) and mobile devices (Android).

3.2 The first chapter of Kiddo

The first chapter of Kiddo addresses the gender stereotype of colors attached to gender: "blue is for boys and pink is for girls" (see **Fig. 3**). In this chapter, players will make decisions regarding Juan (the twin boy) and the color to paint his bedrooms' walls.

The story begins with the family arriving in a new town and entering their new house. Despite being twins, Juan and María start to feel people treating them differently because of their gender. In the pilot chapter, Juan's desire is to use pink color for his room,

and for the first decision crossroad, players will have to decide whether pink is a suitable color for Juan’s bedroom’s walls, or if a different color will be more adequate for him. During the chapter, players could decide on the color on multiple occasions, and will have to face different opinions regarding this stereotype: particularly, the twins’ father will be against painting Juan’s bedroom walls pink (“*men do not use pink, it is a color for girls*”) while the twins’ mother will have a more open attitude towards it. In the end, however, the decision falls on the player and, after facing different opinions and comments, could change their initial opinion and decide whether they chose pink or another color.

As in the other chapters, early decisions will determine whether players achieve the “heart of courage” which will help them fight the monster that appears at the end of the chapter (see Fig. 3, right). If using the heart or final choosing to fight the stereotype, players will defeat the monster of this first chapter. In case that they still agree with the gender stereotype, they could not defeat the monster and will be directed to a short video explanation on why colors are gender neutral.



Fig. 3. Screenshot of Kiddo’s first chapter including characters’ dialogues (left) and the final monster (right).

4 Usability and acceptance evaluation

4.1 Methods

The evaluation carried out with the first chapter of Kiddo had a twofold purpose: 1) to evaluate the usability of the game and 2) to evaluate the acceptance of the game, using its first chapter as a test pilot.

Usability evaluation

The usability evaluation conducted for Kiddo is based on the usability surveys conducted periodically by the commercial videogame company Garena, regarding its star title “Free Fire”, a commercial Battle Royale videogame with millions of users across the globe. In the surveys, they ask users about their operative systems, the devices used to play the game, the devices the user has access to, etc. Those questions are highly relevant for Kiddo’s usability evaluation and proved to provide highly important information. The final questionnaire used for the usability evaluation was adapted from the abovementioned surveys [19] selecting the questions that were relevant to the content of the first chapter of Kiddo. The questionnaire started with some basic questions about

the game environment (which device and operating system did they play the game in, and device they prefer to play in) and whether they had any issues installing or executing Kiddo, with an optional open text field to describe any issues encountered. After that, the usability questionnaire included 13 free-text questions (see Table 2).

Table 2. Questions included in Kiddo’s usability questionnaire.

Usability question	
1	<i>Were you able to talk to all the characters?</i>
2	<i>Were you able to collect all the items?</i>
3	<i>Were you able to use the objects correctly?</i>
4	<i>Were you able to interact with the map?</i>
5	<i>Were the game instructions clear?</i>
6	<i>Were the buttons easy to find?</i>
7	<i>Did you find any buttons that did not work correctly?</i>
8	<i>Did the facial expressions of the characters match the dialogue shown?</i>
9	<i>Do the scenes change correctly?</i>
10	<i>Did you ever get lost/didn't know what to do?</i>
11	<i>Was the music present throughout the game?</i>
12	<i>Did you manage to complete the game?</i>
13	<i>Did you have any problems using the game?</i>

Acceptance evaluation

The questionnaire to evaluate the game acceptance was based on the one used in "Campus Craft" [20]. Within the context of Kiddo’s topics and by addressing questions especially designed to evaluate the pilot chapter, it contains three parts: (1) demographic information about participants, (2) acceptance of the characters of the game and (3) acceptance of the game story.

The demographic information inquired about age, gender, and profession.

The characters’ acceptance questions included five questions about the opinion of game characters with 3 possible answers (“fun”, “boring”, and “I don’t care”) and two further 5-point Likert questions about the style of the characters.

The story’s acceptance questions included: four 5-point Likert questions inquiring about participants’ opinion about the speed of the game texts, how fun the story was, how likely they are to play new chapters of the game, and if they consider the gender equality message of the game is clearly depicted; a set of 17 tags (*Killing time; Educational; Simulation; Leisure; Social; Bored; Teamwork; Adventure; Easy to play; Understandable; Good control, comfortable to handle; Intuitive; Low demands on my computer/is light/works well on my computer; Irrelevant; Interesting; Uninteresting; Difficult*) to choose the 3 that they consider best describe Kiddo; a score (1 to 10) of how much they liked the pilot chapter; and two final free-text questions about anything that they will add/erase from the chapter and final comments/suggestions for the game.

4.2 Participants

The first chapter of Kiddo was played by 10 participants, between 20 and 51 years old, of different professions related to education and social studies (a social science student, two high school students, a nurse, a sociologist, a consultant, an administrative assistant, two primary education teachers, and a school supervisor) from Mexico.

4.3 Evaluations

The evaluations began on September 15, 2022, for 22 days ending on October 7, 2022. The evaluation was performed from the participants' homes, with their own technological devices (Laptops, PC's, smartphones, or tablets) in Mexico. A video tutorial was sent to the participants, along with the proper APK's and EXE's, to help them with the installation of the game, to avoid any issues and to ensure a clean install. However, for older users (50+) the intervention of the developer via videoconference or a phone call was needed, since they were not too familiar with the installation process. After playing the first chapter of the game, participants provided their opinion in two Google forms. Their comments are being used to modify and improve Kiddo. The changes and improvements suggested by the test users will result in the final version of the game.

5 Results

5.1 Results of usability evaluation

Kiddo prototype executables were created and provided for participants for both Android and Windows. Regarding participants' regular usage of videogames, two participants declare playing more than 4 hours a day, three participants played between 1 and 3 hours a day, two participants rarely play videogames, and the other three do not play videogames at all. In terms of their playing devices, one participant prefers to play on a console, another participant on tablet, four on smartphones and the other four prefer to play on a laptop or PC. Three participants played Kiddo on PCs, one on tablet and the other six on smartphones.

During the installation on PC/laptop, some participants experienced problems because their PCs were too slow, and/or the screen froze. During the installation on a smartphone, some participants experienced problems because they did not understand the installation instructions and were not able to install it on smartphones, so they changed to PC, where they were able to successfully install and play Kiddo. Overall, four participants successfully installed Kiddo without any issues, while three participants stated that they encountered some issues during the installation of the game. In general, participants under the age of 40 were able to install Kiddo on their devices and those over 40 required some more specific guidance to complete the installation of the executable on the desired device.

Table 3 shows the summary of the responses for the usability questions (stated in **Table 2**). Results show positive outcomes in game completion (question 12), scenes changes (question 9) and interactions with characters and items (questions 1 and 2).

The most important errors appeared at the start of the game where participants were not sure about what they had to do (question 9), and instructions did not help them (question 5), and some issues with the game interface such as finding the buttons (question 6).

Table 3. Results of Kiddo’s usability questionnaire.

Results of usability question	
1	Most participants were able to talk to the characters; only one participant was not able to talk but only to read the dialogues.
2	Most participants were able to collect the objects.
3	Most participants were able to use the objects; only one participant was not able to grab the last object (the heart of courage), since it did not appear in the backpack (inventory).
4	All but one participant were able to interact with the map.
5	Most participants stated that the instructions were not clear at the beginning of the videogame or that they could be improved.
6	Most participants had issues finding the buttons.
7	All but one participant found that buttons worked correctly.
8	Most participants stated that the facial expressions matched the shown dialogue; one participant mentioned the case that when repeating the dialogues from the beginning in the living room scene, the characters' expressions do not match the dialogue.
9	All participants stated that the scenes reproduce correctly.
10	Most of the participants stated that they did not know what to do at the beginning of the videogame.
11	All participants listened to the music throughout the videogame.
12	All participants were able to finish the videogame.
13	There were no other problems using the game.

5.2 Results of acceptance evaluation

Participants provided several insights in the first part of the acceptance questionnaire. About the characters María (girl) and Juan (boy), most participants think the characters are funny and they liked the style of the twins. Additionally, all participants found the twins’ hair color amusing. About the parents’ characters (Lucy and Roberto), most participants did not show any interest in the appearance of the parents nor were they attracted to the style of the parents. About the speed of the texts, most participants think that the speed of the texts is too slow. About new chapters, all participants said they are interested in playing a new chapter of the game. About the story, most participants think that the story is funny/interesting enough. And finally, about the message of the game, all participants stated that the message of gender equality is clear.

Regarding the list of keywords provided, in which participants selected the 3 words that they believe best describe Kiddo, main results were: all participants selected “*Educational*”; several participants selected the keywords “*Simulation*”, “*Social*” “*Understandable*”; and some participants selected “*Low demands on my computer/is*”

light/works well on my computer”, “*Good control, comfortable to handle*”, “*Adventure*”, “*Intuitive*”, “*Easy to play*”, and “*Interesting*”. It is noticeable that no participant selected any of the negative keywords (“*Bored*”, “*Irrelevant*”, “*Uninteresting*”, or “*Difficult*”). The average rating for the overall score given by participants to the first chapter (pilot) of Kiddo (in scale 1 to 10) is 7.5.

Participants provided some suggestions or areas of opportunity to improve the chapter, including possible additions to the game (e.g., more precise indications, a help button, an initial video to set up the story) and changes (e.g., shorten some of the dialogues). The final free comment section allowed for additional suggestions to improve the next chapters of Kiddo. Participants’ comments included:

- “I suggest creating and fighting the stereotypical monster of fear of decision making, it would be worthwhile to add to autonomy training.”
- “I liked the characters in general, but the monster is more attractive than the rest”.
- “Testing with children, as an adult you may not understand a lot of things, but children are more likely to find their way around faster”.
- “Add instructions and improve the style of the parent characters”.
- “The hearts representing the health or the life of the character, are really confusing. I thought that those were the Hearts of Courage, but they were life indicators.”
- “It is a very interesting proposal to present cases where analysis and decision making are encouraged. The design can be made more attractive and the activities and challenges of the game can be related in a more direct way.”
- “I found the message of respect in terms of choice of tastes and gender interesting, but the story gets long with the dialogues, it would be good to include an introduction and instructions on how to play and at the end of the chapter a brief conclusion.”

5.3 Summary of evaluation results

The results of the usability evaluation, and the acceptance evaluation of the first chapter of Kiddo are very promising. The initial evaluation carried out for its first pilot chapter has received mainly positive feedback from the participants, which lets us expect a good acceptance among the final users. The current evaluation shows that Kiddo still needs some work to be completely accessible for all users. Particularly the beginning of the game was not clear enough, and additional instructions need to be provided to players to understand the purpose of the game. The game should include a better tutorial to guide players in their initial interactions with the game and to clearly state the game goal. Although we know that there are some issues with the pilot version of Kiddo, the comments and suggestions gathered from this evaluation allow us to address these found issues and get them fixed in the final version of the game.

6 Conclusions

Kiddo is a videogame to address gender stereotypes in Mexico. The first prototype of the videogame has been evaluated with educators. It is important to have in mind that the pilot tests were conducted with adults for several reasons: even though kids will be the final players of the game, we needed more technical and expert opinions to be able to quickly identify the issues and bugs present in the chapter, as well as the areas for improvement that both teachers and gender experts may suggest.

The main outcome of this evaluation is that the game was very positive perceived by educators as they consider it could be a relevant content to initiate a fruitful discussion with the students based on a common experience. They consider that the game could be an effective way to address the topic of gender stereotypes at school.

However, Kiddo is still a prototype that has been formatively evaluated with a limited number of users. With all the feedback collected from educators and students we will produce the final complete version of the game. This final version will be applied in at least 2 elementary schools in Mexico (which have already agreed to apply Kiddo in their classes). In these applications, Game Learning Analytics will be collected from players' interactions with Kiddo. These collected analytics will help us to continue the summative validation of the game and measure the impact of the game on its target players.

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