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Video Games That Educate: Breaking Gender Stereotypes and Promoting Gender Equality with a Serious Video Game

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Abstract: By incorporating elements such as storytelling, problem-solving, and rewards, serious games can appeal to varied users, making the learning process more experiential, engaging, and enjoyable. Gender stereotyping is a prevalent social problem that occurs to a greater or lesser extent in all countries and cultures around the world. However, it is more present in certain places like Latin American countries. This study presents the evaluation of Kiddo, a serious game to raise awareness about gender stereotypes among school-aged children (10–13 years old). After its validation with teachers, this evaluation study was carried out with 210 students in a public school in Mexico. By conducting a pre-post experiment while collecting game learning analytics data, we explore how Kiddo can raise students' awareness of gender stereotypes. Results show a statistically significant increase in awareness of all gender stereotypes addressed in the game. In addition, we explore the acceptance of the video game, the feelings that it causes in players, and the validity of its design as an educational tool including requirements such as class duration and participants' reading ability. Kiddo provides a valuable real-world experience in a safe and controlled environment.

Keywords: serious games; gender stereotypes; technology-enhanced learning; game-based learning; equality education

1. Introduction

Serious games (SGs) have emerged as potent educational tools, offering several benefits [1]. Games engage users in immersive learning experiences, shape behavior, and foster new skills and knowledge acquisition. These interactive games create experiential learning situations that can significantly boost motivation and retention rates among learners, leading to more effective training outcomes. In addition to their educational benefits, serious games have proven to positively impact mental health and well-being. Moreover, serious games can reduce stress and anxiety and promote creativity by offering a fun and interactive way to learn and grow [2].

Gender stereotyping is a very relevant and prevalent social problem that occurs to a greater or lesser extent in all countries and cultures around the world. Gender stereotypes are deeply ingrained in society and continue to impact individuals daily, creating expectations and limitations based on one's gender, and perpetuating harmful beliefs that can have a deep impact on life hindering personal growth and success. Challenging and dismantling these stereotypes is crucial to building a more inclusive and equal society for all individuals, regardless of gender. By recognizing and addressing gender stereotypes, we can work towards a more equitable and just society for everyone.

Stereotypes are a global problem, but they are particularly prevalent in certain cultures and countries, such as Latin American countries like Mexico. According to 2021 figures from a national survey (Encuesta Nacional sobre la Dinámica de las Relaciones en los Hogares), gender roles and stereotypes are still present worldwide. Mexican society is not an exception, since gender stereotypes and sexist behaviors are still accepted by a significant part of the population (88%) [3], resulting in discrimination, especially against women. This is why, when laying the foundations on which the individual will develop, it is imperative to address gender stereotypes from an early age [4].

Gender stereotypes arise from childhood, limiting the developmental possibilities of each individual and perpetuating gender inequalities in society. Stereotypes affect both genders: women are denied leadership positions or professions considered "for men", while men are pressured to repress their emotions and conform to a standard of masculinity that can be harmful to their emotional well-being.

To combat gender stereotypes in developing countries in general and in Mexico in particular, it is necessary to better educate society about gender equality and promote diversity and inclusion in all areas. It is incumbent upon educational institutions, the media, and society to work together to challenge gender norms and promote equal opportunities for all people. We believe that it is crucial to start by improving equality education in schools and that serious games are both an effective and scalable approach that can help alleviate this problem.

In this article, we present the evaluation study of Kiddo, a video game to raise awareness about gender stereotypes in Mexico [5]. Kiddo seeks to make the most common gender stereotypes visible to educate about equality. The game story occurs in common children's scenarios: school, home, a park, etc. The main game characters are two twins (a boy and a girl) who encounter situations related to gender stereotypes that they must overcome without upsetting themselves or the other twin. The evaluation study of Kiddo included a brief introduction to what a degenerative stereotype is, the pre-questionnaire, the video game playthrough, and the post-questionnaire. Comparing the pre- and post-questionnaire results will allow us to verify whether the video game has succeeded in raising awareness of gender stereotypes.

The rest of this paper is structured as follows: Section 2 presents work related to our research topics and other relevant tools and finalizes by presenting the current study and its research questions (RQs). Section 3 describes the materials and tools used in the study, mainly the video game Kiddo, and the methodology followed, including the procedures and methods used to apply Kiddo. Section 4 breaks down the results obtained in the study, which are then discussed in Section 5 concerning the RQs posed, including limitations and possible future work. Finally, Section 6 presents the conclusions of the study.

2. Related Work

2.1. Serious Games and Gender Equality

Serious games (SGs) have a main purpose other than entertainment, enjoyment, or fun [1]. In addition to their educational benefits, SGs positively impact mental health and well-being. Offering a fun and interactive way to learn and grow, these games can reduce stress and make them feel free. Due to these characteristics, SGs have been applied in different knowledge areas with promising results, including applications in the e-health field and to address social problems, such as bullying, domestic violence, and discrimination [6].

To date, several SGs exist intended to create awareness regarding issues such as bullying, cyberbullying, or gender violence, among other social topics.

For gender equality in particular, different videogames have been developed addressing a variety of topics including consent, teen dating violence, gaslighting, and gender

equality. Focusing on consent, the videogame *ADRIFT* [7] places players in a spaceship where they must interact with an AI, emphasizing communication and boundaries. *Crossing Boundaries* [8] follows three friends traveling the world, learning about different perspectives on consent. *How to Blorrble-Blobble* [9] uses dance lessons to teach the importance of asking for explicit consent. *Stuck in a Dark Place* [10] explores consent through the dreams of a woman in prison, and *Respect Dance* [11] teaches consent in relationships through an interactive story. Other games address teen dating violence. For instance, in *Grace's Diary* [12] players help a friend recognize an abusive relationship, and in *The Guardian: TDV Missions* [13], players go through different scenarios to identify warning signs. *Leaving* [14] portrays the emotional difficulty of escaping an abusive relationship, while *A Casual Chat* [15] uses a text-based format to uncover the reality of an unhealthy romance. *Another Chance* [16] and *A Decision of Paramount Importance* [17] educate players on distinguishing between healthy and unhealthy dating behaviors. Some games, like *Lamplight Hollow* [18] or *LED Gaslight* [19], focus on gaslighting, a form of psychological abuse where victims are manipulated into doubting their own reality. Finally, the videogame *Honeymoon* [20] examines how abusive relationships can affect people of any gender or sexual orientation. *Citizen Witch* [21] and *Step Up* [22] emphasize the role of bystanders in preventing violence and bullying, while *A Normal Lost Phone* [23] and its sequel focus on themes of identity, sexuality, and social pressure. Other video games promote gender equality and social awareness, such as *Chuka: Rompe el Silencio* [24] and *Tsiunas* [25], which educate players about gender-based violence in Latin America. There are still other games, such as *City Watch* [26] or *Half the Sky Movement: The Game* [27], that focus on sexism, relationship education, and global women's rights.

However, a review conducted in 2022 found that the number of SGs addressing gender-equality-related topics was scarce, besides focusing primarily on gender equality itself, and leaving a blank area regarding gender-stereotype-related issues [28].

2.2. Gender Stereotypes in Mexico

Gender stereotypes, gender violence, and discrimination against women are serious societal problems frequently ignored or not adequately addressed nowadays. Among the different types of discrimination that exist, these sexist behaviors are present in all cultures and social environments. These issues are particularly severe in educational institutions, which commonly lack effective protocols to address them [29].

While gender stereotypes are present globally, they are particularly prevalent in specific countries, one of which is Mexico. A study conducted in Mexico with a sample of more than 26,000 students in basic education shed light on the existing gender problems in the country and identified the most common stereotypes faced by children [30]. In particular, the gender stereotypes with higher prevalence among children were "boys do need to finish school and prepare themselves to maintain their future home" (more than 85% of boys agreed with it, and 82% of girls) and "girls should learn to help out at home by taking care of their siblings and doing the cleaning up" (78% of boys and girls agreed).

2.3. Present Study

Due to the lack of games or digital tools that address still-present gender stereotypes, we designed and developed a serious game, Kiddo, to focus on gender equality awareness for young children in Mexico [5]. Based on the results from [30], we selected the stereotypes that could be most relevant to our target population for the Kiddo game, which contains four chapters addressing different gender stereotypes:

1. Colors: "Blue is for boys and pink is for girls."
2. Sports: "Some sports are for girls and some are for boys."

3.   Studies: "Boys are better at mathematics and girls are better at the arts."
4.   Household: "Household chores are only for girls".

The game Kiddo addresses some of the basic but still common stereotypes to be a support tool for teachers. Once all students have played the game and had a common experience dealing with some stereotypes, the teacher can initiate a more grounded conversation about equality education that includes some new aspects (e.g., other stereotypes) not directly addressed by Kiddo.

With a sample of target game users, we aim to evaluate the effect of the game Kiddo, as well as its usability and participants' opinions. The experiments and the analyses carried out in this study aim to answer the following research questions:

1.   RQ1. Do players' agreements with sexist behavior change after playing the video game Kiddo?
2.   RQ2. Does playing the video game Kiddo produce a positive effect on players' awareness of gender equality? In particular, we focus on the specific gender stereotypes addressed in the game chapters. Therefore, to explore this in further detail, we pose the following related research question for each of the game chapters:
     a.   RQ2.1. Did the stereotype about the use of colors in Kiddo Chapter 1, entitled "Blue is for boys and pink is for girls", generate awareness in the players?
     b.   RQ2.2. Did the stereotype about physical activities in Kiddo Chapter 2 entitled "Some sports are for girls, and some are for boys" generate awareness in the players?
     c.   RQ2.3. Did the stereotype about studies in Kiddo Chapter 3, entitled "Boys are better at math and girls are better at art", generate awareness in the players?
     d.   RQ2.4. Did the stereotype about domestic activities and responsibilities in Kiddo Chapter 4 entitled "Housework is only for girls" generate awareness in the players?
3.   RQ3. Do the players think they learned about gender equality while playing the video game Kiddo?
4.   RQ4. How long do players take to complete the video game Kiddo?
5.   RQ5. Is the video game Kiddo well accepted among students?
6.   RQ6. What feelings did the video game Kiddo provoke in the players?

3. Materials and Methods

This section presents the materials used in the current evaluation study (the serious game to be evaluated, Kiddo, and the questionnaires used for the pre- and post-evaluations), and the methodology follows.

3.1. Materials

3.1.1. Kiddo: A Serious Game Against Gender Stereotypes

Kiddo is a narrative and decision-making video game to address gender stereotypes among children aged 10–13 [5], presented in a 2D "point and click" format. Kiddo seeks to challenge and break down the most common gender stereotypes to promote education and awareness about gender equality. Highlighting these stereotypes, Kiddo aims to spark conversations and inspire change towards a more inclusive and equal society. Through education and visibility, Kiddo hopes to empower individuals to create a more diverse world for all.

The Kiddo video game was designed and developed through several stages to ensure the acceptance of teachers, parents, and students/players. This incremental approach has allowed us to effectively incorporate feedback from various stakeholders to ensure the

game is educational, entertaining, and safe for its audience. For instance, mechanics and dynamics from the adventure genre such as challenges and rewards have been promoted, as they have been shown to increase player motivation and engagement in educational environments [31]. In addition, a thorough playtesting, user experience, and usability analysis of the gameplay and interface have been carried out to ensure that it is intuitive and easy for young players (9–13 years old) [5]. These improvements have led to Kiddo being widely accepted and recommended by the local educational community and parents, making it a valuable tool for playful and collaborative learning, before this evaluation study.

The story revolves around everyday settings in a child's life like school, home, and the park. The game's main characters are a pair of twins (a boy and a girl) who struggle against obstacles rooted in gender-based social expectations. Together, they can overcome these obstacles and explore methods to break free from these ingrained norms without harming each other. In these situations, the twins, Juan and María, participate in dialogues and exchanges with other in-game non-playable characters (NPCs). These interactions enable players to explore various viewpoints and plotlines and ultimately allow the players to express their gender stereotype alignment and see its direct consequences. Juan and María's distinct characteristics and attributes enhance the overall gaming experience, providing players with choices that influence the course of their adventure. Players can easily observe how their choices affect the character's emotional state throughout the game using a mood bar that monitors their characters' emotions. By engaging with NPCs, players can unveil hidden mysteries, solve challenges, and ultimately shape the fate of the game's characters.

Figure 1 shows the four Kiddo chapters as displayed in the game, including the topics introduced in Section 2.3 about Colors, Studies, Sports, and Household activities. Table 1 presents the gender stereotypes addressed in each of the game chapters.
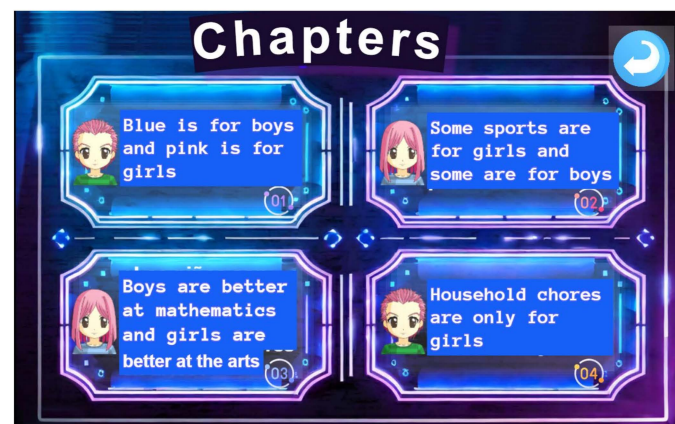
Figure 1. Kiddo's main menu shows the 4 game chapters (figure translated from the original in Spanish).

The Kiddo game captures game learning analytics (GLA) data of player's interactions, provided out-of-the-box by the uAdventure framework [32]. The Kiddo GLA model captures different types of traces linked to players' interactions within the game. Progression and completion traces are used to measure the play time length and obtain statistics about the game's completion and its chapters. Other traces captured by Kiddo include answers in dialogs, access to scenes, and interactions with game objects and characters.

The system uses the xAPI open-source standard [33] to format the in-game traces during the learning process, using the xAPI for Serious Games profile [34], which includes a vocabulary to identify all the in-game significant moments like progressed or completed. All GLA traces are anonymized at source, being solely tagged by an anonymous identifier provided for each student, with teachers being the only participants with access to the

correspondence between identifiers and specific students. The anonymous identifier is used to relate both the GLA interaction data and the pre- and post-questionnaires for each student, as described below.

Table 1. Summary of the gender stereotypes included in the 4 Kiddo video game chapters.

Kiddo Chapter	Compilation of Gender Stereotypes Addressed
1.　Colors	There are special colors for girls and unique colors for boys Blue color is for boys and pink color is for girls Boys should not cry It is not right for boys to play with dolls, because this is a girl's game
2.　Sports	Girls should not do mainly things like rough sports Only boys are strong Girls are weak and delicate Girls should not play rough
3.　Studies	It is not important that girls study Girls are not good at math Boys should not like art Boys make better decisions than girls
4.　Household	Men should not help with housework at home Only girls should learn how to do housework Only men can use tools at home Only men should go out to work and women should stay at home and take care of the children.

3.1.2. Questionnaires

The pre-test completed by participants contained four sections:

1. **Privacy statement**: States the conditions of data collection to ensure transparency and inform users about how their data are being collected and used.
2. **Demographic data**: Information about the player (age, school grade, and sex).
3. **Sexist behavior diagnosis**: Contains four diagnostic statements of sexist behavior, to be answered with a five-point Likert scale. The statements are: "the man is in charge at home", "women should always obey men", "men work, women stay at home", and "the woman is the one who should take care of the family".
4. **Gender stereotypes questionnaire**: The instrument to measure gender stereotypes awareness contains 16 statements on gender stereotypes related to the four chapters of Kiddo (four statements per chapter), to be answered using again the five-point Likert scale (1 strongly disagree to 5 totally agree). The 16 gender stereotypes statements included in this questionnaire are stated in Table 1.

The post-test included two sections for pre-test comparison, and two sections to gather opinions, comments, etc.:

1. **Sexist behavior diagnosis**: Same statements as Section 3 of the pre-test.
2. **Gender stereotypes questionnaire**: Same instrument as Section 4 of the pre-test.
3. **User experience**: Five statements regarding user experience and perceived learning with the game to be answered again using a five-point Likert scale. The statements are: "Through the game, I have learned about equality", "At times I have felt lost and not knowing what to do", "In the game, I have been able to choose different alternatives to solve it", "Activity with the game is fun", and "Learning through play is better than a class on equality (Civics and ethics training)".
4. **Open-ended opinion questions**: "Have you managed to complete the game?", "Did you have any problems during the game?", "What did you like most about the video game Kiddo?", "What did you not like about the video game Kiddo and what would

you change to improve it?", "What do you think of the story, do you find it interesting, funny, or appropriate?", and "What has the game made you think about?".

The response values in the gender stereotypes questionnaire may be summed to obtain a global score that reflects each participant's general awareness of gender stereotypes [35]. A higher score indicates a higher agreement with the stereotypes, i.e., a lower awareness. The expected scenario was to reduce the global score (sum of all individual statement responses on the Likert scale) in the gender stereotypes post-test questionnaire compared to the pre-test. This will indicate that Kiddo delivers an educational message on gender equality, as stereotypes are one of the many forms in which gender inequalities are present [3].

3.2. Methods

With the materials described (Kiddo video game, and pre- and post-questionnaires), we carried out the evaluation study as follows.

3.2.1. Methodology

The study followed a pre–post design consisting of three stages in which participants: (1) completed the pre-test; (2) played the game from beginning to end, including the 4 game chapters; and (3) completed the post-test. While participants played the game, GLA interaction data were collected to verify players' game completion and obtain objective data (e.g., gameplay time).

3.2.2. Prerequisites

The application of a video game in schools in Mexico needs to comply with several authorizations and requirements. First, the academic authorities in Mexico (Dirección General de Operación de Servicios Educativos (DGOSE)) have to review the game. For that, an early version of Kiddo containing its first chapter (color stereotype) was submitted to the DGOSE for approval. That version was well received, and it was suggested to align Kiddo's contents with the gender equality content of the Secretary of Public Education (Secretaría de Educación Pública (SEP)) programs, such as the one contained in Block 2, Sequence 3 (Building Equality Together) of the book Civic and Ethical Formation for third grade, edited by SEP [36]. While the video game was being adapted to meet those requirements, a new version of the public education textbook was published to be used in all schools, so we had to re-align Kiddo to the new book editions containing the section on gender inequality [37,38]. After ensuring the game had the educational contents of the latest books and presenting the latest version of Kiddo to the authority in education in Mexico, DGOSE, we obtained their authorization to apply the video game in a public elementary school. Three schools in the same area were considered, but only one of them had the necessary equipment and availability. Therefore, the Erasto Valle Alcaráz, an elementary public school, was selected for this study.

3.2.3. Participants

The participants of this evaluation study of Kiddo were primary school students, between 10 and 13 years old, from a public school (Erasto Valle School) in Mexico City, where we had the required authorization to apply the game.

A total of 280 students were considered to participate, but 66 of them were unable to participate due to different reasons (e.g., inability to attend classes, lack of parental permission, refusal to participate in the activity). Three students failed to complete all stages of the study, and one participant was excluded because she did not meet the age requirements (the school area coordinator who wanted to play the game). Apart from the age of the students, no other inclusion or exclusion criteria were applied.

Finally, 210 students completed the three stages of the study (pre-test, video game play, and post-test). Their age distribution is depicted in Figure 2 (left), with most participants being 10 or 11 years old. Per school grade, 55 participants were in fourth grade, 85 in fifth grade, and 70 in sixth grade. Figure 2 (right) shows the participants' sex: 93 boys, 107 girls, and 10 who chose not to disclose it. The almost equal distribution between boys and girls allows us to obtain more representative and accurate results.
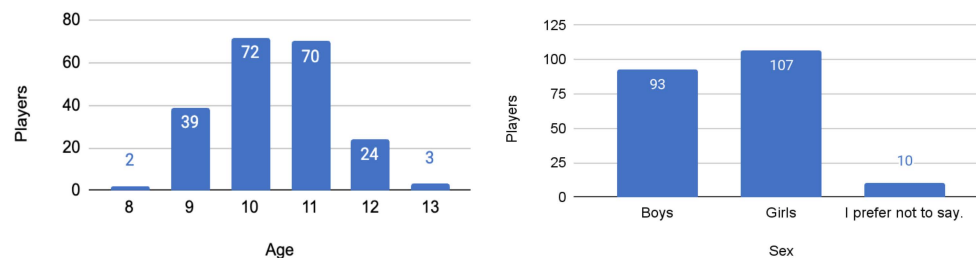
Figure 2. Age (**left**) and sex (**right**) of the players participating in the study.

3.2.4. Data Acquisition and Analysis

After meeting all prerequisites and before beginning the application sessions, Kiddo was installed on the 9 computers available that had a 64-bit Windows system, which was required for the game. Four personal computers were additionally used. During the sessions, researchers were always accompanied by the teacher in charge of the class.

Due to school schedule restrictions, each session lasted a maximum of 90 min. The sessions were developed as follows: Kiddo was briefly introduced to the students; they then completed the pre-game questionnaire (15 min), played the game (60 min), and finally, completed the post-game questionnaire (15 min). Researchers tried to make gameplays free and unguided, beyond the recommendation to play the chapters in order (from 1 to 4). GLA interactions in the game were collected during the game and sent as traces to a game analysis server. At the end of the study, the participants received a souvenir with the Kiddo theme as a reward for their participation.

The data collection server used Simva (Simva—eUCM (e-ucm.es) via https://www.e-ucm.es/portfolio-item/simva/, accessed on 1 March 2025), a GLA platform for validation and study management with questionnaires. Simva anonymously and securely identified the players and guided them through the study [10]. For that, a random identifier is created for each player so that all information is pseudo-anonymized at the source. Simva first captured the pre-test and allowed the players to play the game, collecting the GLA associated with the player. After the gameplay was finished, Simva provided access for players to the post-test. Consequently, all data sources for each player (pre-test, GLA data, and post-test) are linked through the anonymous identifier provided by Simva.

Pre- and post-questionnaire results were compared using statistical analysis (paired *t*-test) and Cohen's effect size (d). The GLA interaction data captured with the game were processed using Python v. 3.11.9 to analyze its JSON-type format and retrieve basic simple statistics (gameplay times, completion of the game chapters).

4. Results

In this section, we present the results for each RQ stated in Section 3, based on the data collected from the pre-and post-questionnaires and in-game interactions of the participants in the study.

4.1. RQ1. Do Players' Agreements with Sexist Behavior Change After Playing the Video Game Kiddo?

To answer this question, based on the 5-point scale for each of the four statements, we calculate the score by combining the scores for all students in all four sexist behavior statements. For our study, the maximum number of points in a group of 210 players with a sexist attitude (5 on a Likert scale) in all four questions would be 4200 points (1050 for each question); on the other hand, 210 people with a non-sexist attitude (1 in scale) in all questions would score a minimum of 840 points (210 each). In Figure 3, we observe an initial higher level of sexist behavior (1724 points), which decreases after playing the Kiddo video game (1270 points) by a total of 454 points.
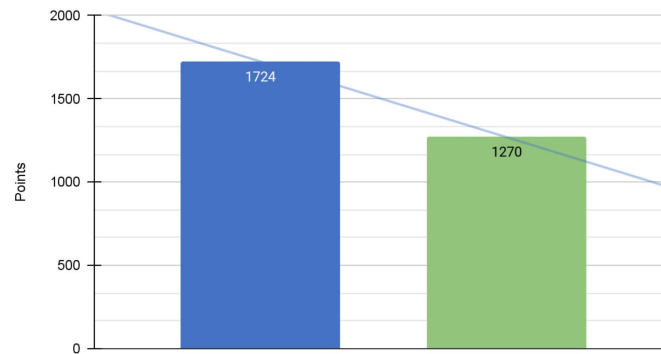
Figure 3. Sexist behavior degree before (**left**) and after (**right**) playing Kiddo.

We split these figures by gender for comparison between women (see Figure 4, left) and men (see Figure 4, right), obtaining similar results for both genders, with a slightly higher decrease for women.
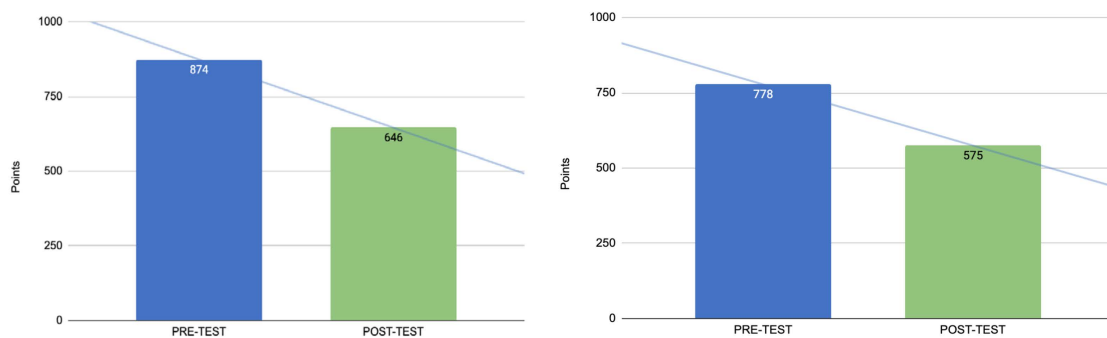
Figure 4. Sexist behavior changes for girls (**left**) and boys (**right**).

In more detail, during the sexist behavior diagnosis, participants stated their agreement with the following statements.

1.　　**Men are in charge at home!**

Figure 5 shows players' agreement before (left bars, in red), and after (right bars, in green) playing Kiddo. Results of the paired *t*-test indicated that there is a significant difference between before (M = 1.7, SD = 1.1) and after (M = 1.4, SD = 0.8), t(209) = 3.9, *p* < 0.001, and d = 0.27 (small effect size).
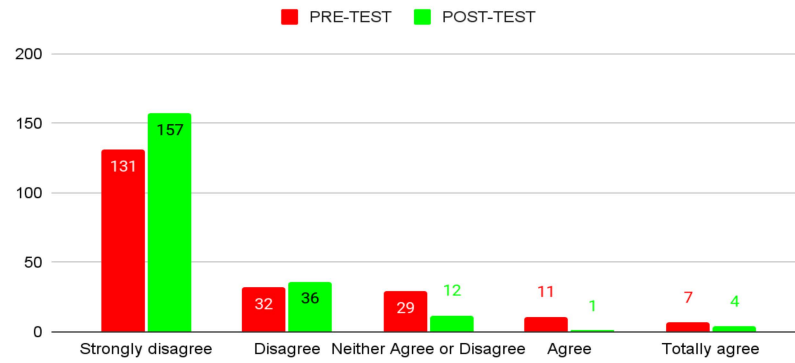
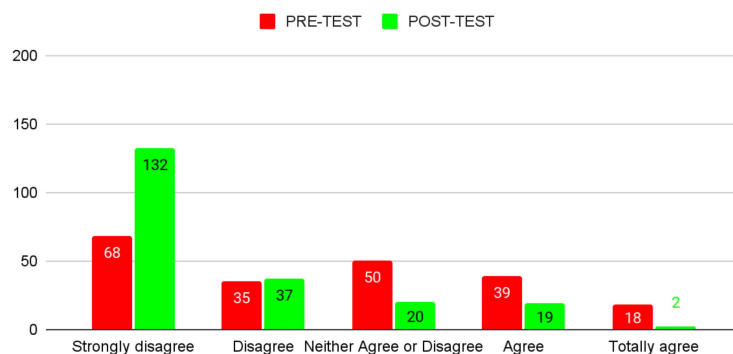**Figure 5.** Pre–post change for stereotype "The man is in charge at home".

2. **Women should always obey men!**

Figure 6 shows players' agreement before (left bars, in red), and after (right bars, in green) playing Kiddo. There is a significant difference between before (M = 1.6, SD = 0.9) and after (M = 1.3, SD = 0.6), t(209) = 2.9, p = 0.005, and d = 0.2 (very small effect size).
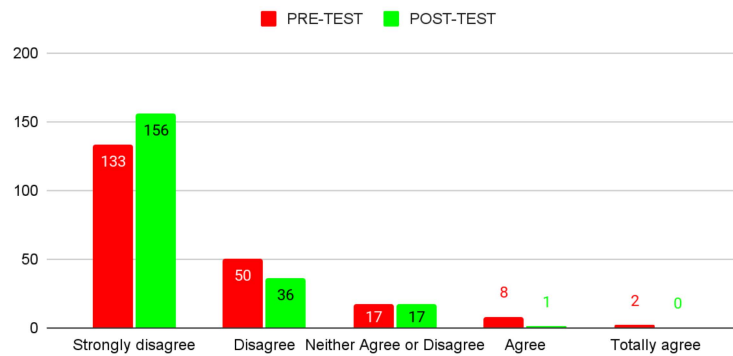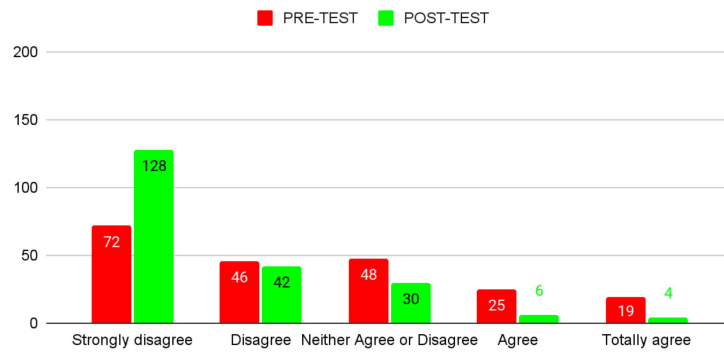

Figure 6. Pre–post change for stereotype "Women should always obey men".

3. **The man works, the woman stays at home!**

Figure 7 shows players' agreement before (left bars, in red), and after (right bars, in green) playing Kiddo. There is a significant difference between before (M = 2.5, SD = 1.3) and after (M = 1.7, SD = 1), t(209) = 7.7, p < 0.001, and d = 0.53 (medium effect size).

Figure 7. Pre–post change for stereotype "Men work, women stay at home".

4. **The woman is the one who should take care of the family!**

Figure 8 shows players' agreement before (left bars, in red), and after (right bars, in green) playing Kiddo. There is a significant difference between before (M = 2.4, SD = 1.3) and after (M = 1.6, SD = 1), t(209) = 7, p < 0.001, and d = 0.48 (small effect size).

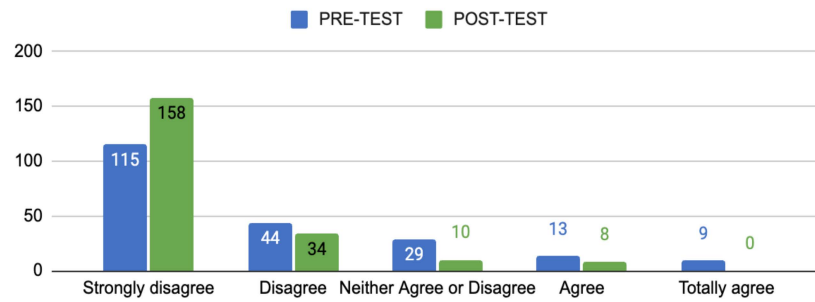**Figure 8.** Pre–post change for stereotype "The woman is the one who should take care of the family".

4.2. RQ2. Does Playing the Video Game Kiddo Produce a Positive Effect on Players' Awareness of Gender Equality?

To study this RQ in further detail, we consider the effect of each chapter of Kiddo on its corresponding gender stereotype. For that, we pose the following related RQs:

4.2.1. RQ2.1. Did the Stereotype About the Use of Colors in Kiddo Chapter 1, Entitled "Blue Is for Boys and Pink Is for Girls", Generate Awareness in the Players?

Results for each of the four statements presented in the pre- and post-questionnaire regarding the stereotypes of Chapter 1 are presented below.

1. **There are special colors for girls and unique colors for boys.**

Only 126 students strongly disagreed with this statement before playing Kiddo, while 169 players disagreed after playing (Figure 9). Results of the paired *t*-test indicated that there is a significant difference between before (M = 1.7, SD = 1) and after (M = 1.3, SD = 0.8), t(209) = 3.8, *p* < 0.001, and d = 0.27 (small effect size).
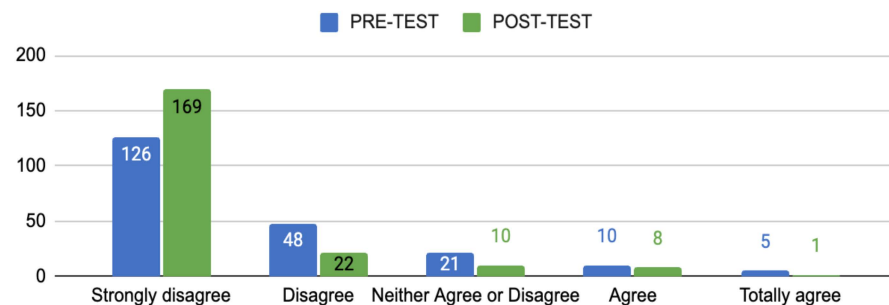
Figure 9. Pre–post change for stereotype "There are special colors for girls and unique colors for boys".

2. **Blue color is for boys and pink color for girls.**

A total of 115 students strongly disagreed with this statement before playing Kiddo, while 158 players disagreed after playing (Figure 10). There is a significant difference between before (M = 1.8, SD = 1.1) and after (M = 1.4, SD = 0.7), t(209) = 5.2, *p* < 0.001, and d = 0.36 (small effect size).

Figure 10. Pre–post change for stereotype "Blue color is for boys and pink color for girls".

3. **Boys should not cry.**

A total of 111 students strongly disagreed with this statement before playing Kiddo, while 139 players disagreed after playing (Figure 11). There is a significant difference between before (M = 1.9, SD = 1.2) and after (M = 1.6, SD = 1.1), t(209) = 2.4, *p* = 0.016, and d = 0.17 (very small effect size).
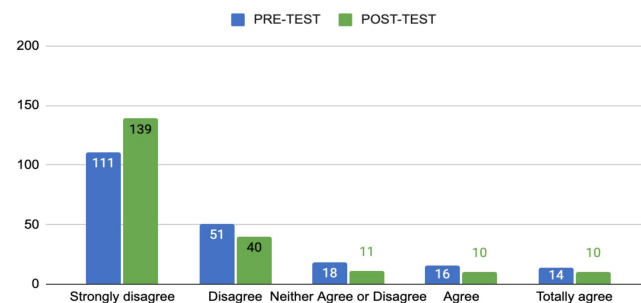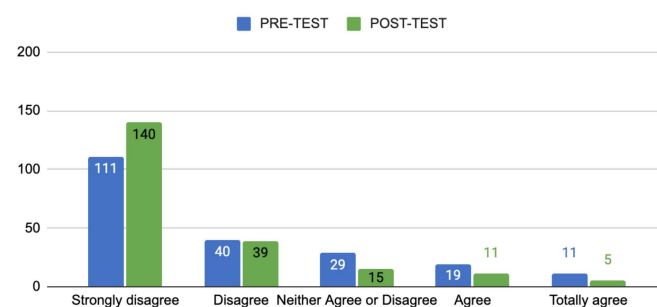

Figure 11. Pre–post change for stereotype "Boys should not cry".

4. **It is not right for boys to play with dolls, because this is a girl's game.**

A total of 111 students strongly disagreed with this statement before playing Kiddo, while 140 players disagreed after playing (Figure 12). There is a significant difference between before (M = 1.9, SD = 1.2) and after (M = 1.6, SD = 1), t(209) = 3.5, *p* < 0.001, and d = 0.24 (small effect size).

Figure 12. Pre–post change for stereotype "It is not right for boys to play with dolls, because this is a girl's game".

4.2.2. RQ2.2. Did the Stereotype About Different Physical Activities for Each Sex in Kiddo Chapter 2 Entitled "Some Sports Are for Girls and Some Are for Boys" Generate Awareness in the Players?

Results for each of the four statements presented in the pre- and post-questionnaire regarding the stereotypes of Chapter 2 are presented below.

1. **Girls should not do manly things like rough sports.**

Only 118 students disagreed with the statement in the pre-test; after playing Kiddo, the number increased to 151 (Figure 13). Again, results of the paired *t*-test indicated that there is a significant difference between before (M = 1.8, SD = 1.1) and after (M = 1.5, SD = 1), t(209) = 2.9, p = 0.005, and d = 0.2 (very small effect size).
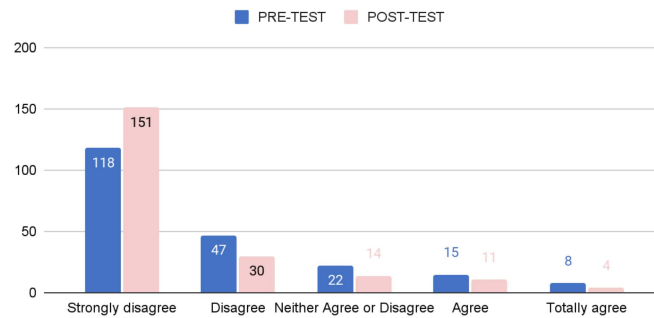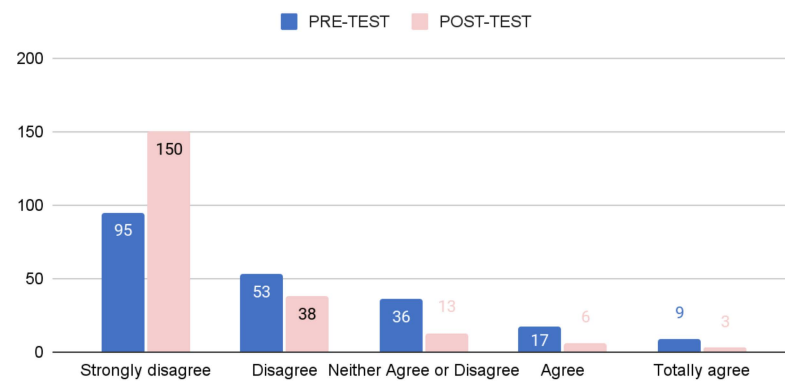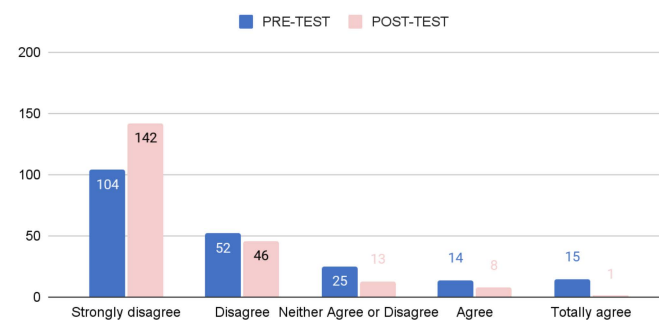
Figure 13. Pre–post change for stereotype "Girls should not do manly things like rough sports".

2. **Only boys are strong.**

Only 95 students disagreed with the statement in the pre-test; after playing Kiddo, the number increased to 150 (Figure 14). There is a significant difference between before (M = 2, SD = 1.2) and after (M = 1.4, SD = 0.8), t(209) = 5.6, p < 0.001, and d = 0.39 (small effect size).

Figure 14. Pre–post change for stereotype "Only boys are strong".

3. **Girls are weak and delicate.**

Only 104 students disagreed with the statement in the pre-test; after playing Kiddo, the number increased to 142 (Figure 15). There is a significant difference between before (M = 2, SD = 1.2) and after (M = 1.5, SD = 0.8), t(209) = 4.8, p < 0.001, and d = 0.33 (small effect size).

Figure 15. Pre–post change for stereotype "Girls are weak and delicate".

4. **Girls should not play rough.**

Only 103 students disagreed with the statement in the pre-test; after playing Kiddo the number increased to 129 (Figure 16). There is a significant difference between before (M = 2.1, SD = 1.3) and after (M = 1.6, SD = 0.9), t(209) = 4.5, *p* < 0.001, and d = 0.31 (small effect size).
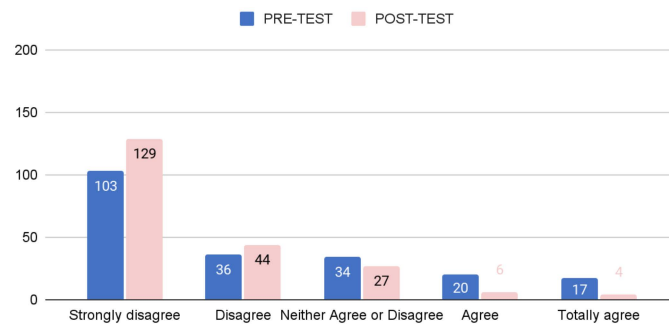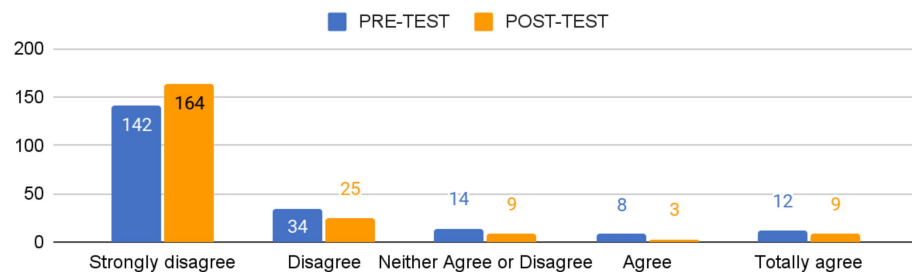

Figure 16. Pre–post change for stereotype "Girls should not play rough".

4.2.3. RQ2.3. Did the Stereotype About Learning Ability in Kiddo Chapter 3, Entitled "Boys Are Better at Math and Girls Are Better at Art", Generate Awareness in the Players?

Results for each of the four statements presented in the pre- and post-questionnaire regarding the stereotypes of Chapter 3 are presented below.

1.   **It is not important that girls study.**

The number of students who strongly disagreed with this statement increased (142 to 164) after playing Kiddo (Figure 17). Results of the paired *t*-test indicated that there is a significant difference between before (M = 1.6, SD = 1.1) and after (M = 1.4, SD = 1), t(209) = 2.2, *p* = 0.028, and d = 0.15 (very small effect size).

Figure 17. Pre–post change for stereotype "It is not important that girls study".

2.   **Girls are not good at math.**

The number of students who strongly disagreed with this statement increased (120 to 145) after playing Kiddo (Figure 18). There is a significant difference between before (M = 1.8, SD = 1.2) and after (M = 1.5, SD = 1), t(209) = 2.5, *p* = 0.012, and d = 0.18 very small effect size).
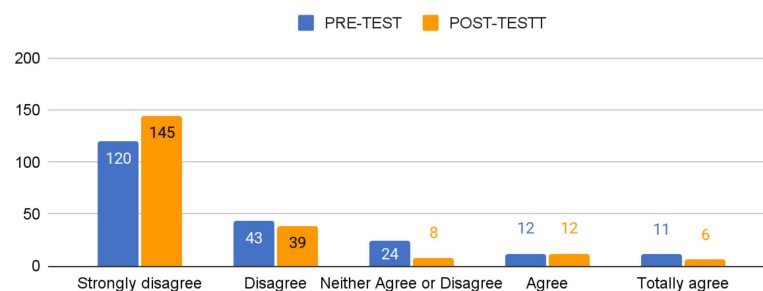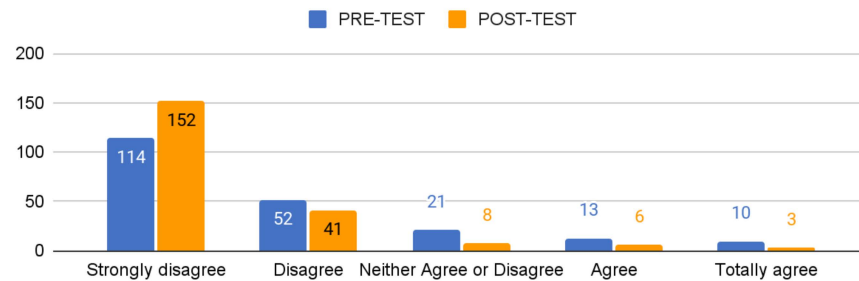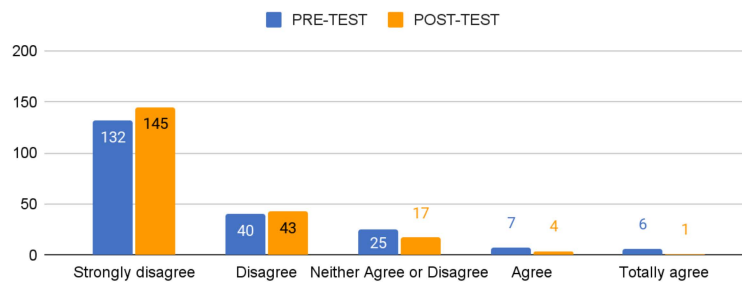

Figure 18. Pre–post change for stereotype "Girls are not good at math".

3. **Boys should not like art.**

The number of students who strongly disagreed with this statement increased (114 to 152) after playing Kiddo (Figure 19). There is a significant difference between before (M = 1.8, SD = 1.1) and after (M = 1.4, SD = 0.8), t(209) = 4.2, *p* < 0.001, and d = 0.29 (small effect size).
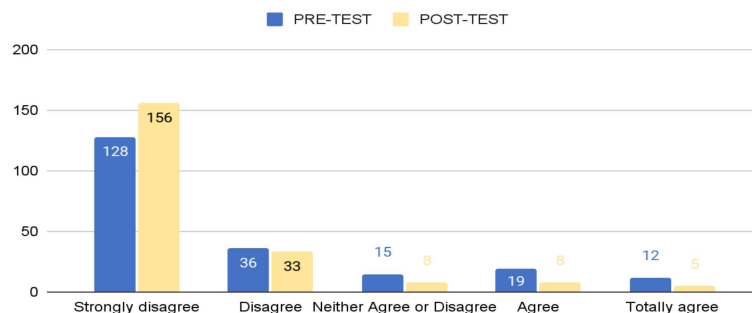

Figure 19. Pre–post change for stereotype "Boys should not like art".

4. **Boys make better decisions than girls.**

The number of students who strongly disagreed with this statement increased (132 to 145) after playing Kiddo (Figure 20). There is a significant difference between before (M = 1.6, SD = 1) and after (M = 1.4, SD = 0.8), t(209) = 2.3, *p* = 0.025, and d = 0.16 (very small effect size).

Figure 20. Pre–post change for stereotype "Boys make better decisions than girls".

4.2.4. RQ2.4. DID the Stereotype About Domestic Activities and Responsibilities in Kiddo Chapter 4 Entitled "Housework Is Only for Girls" Generate Awareness in the Players?

Results for each of the four statements presented in the pre-and post-questionnaire regarding the stereotypes of Chapter 4 are presented below.

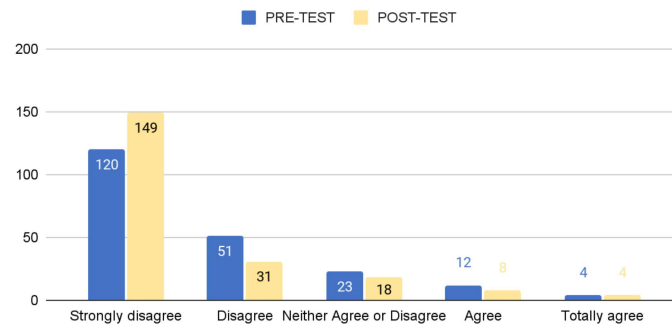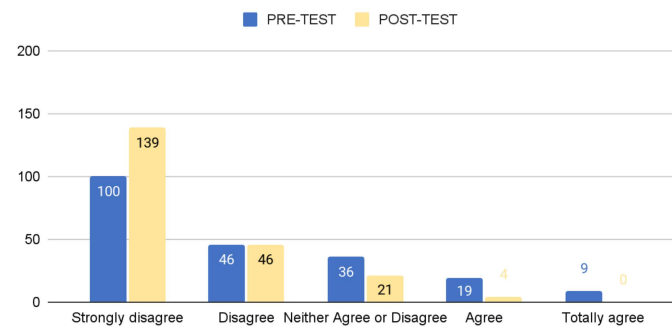1. **Men should not help with housework at home.**

Playing Kiddo increased the number of students who disagreed with this statement (128 to 156, Figure 21). There is a significant difference between before (M = 1.8, SD = 1.2) and after (M = 1.4, SD = 0.9), t(209) = 3.4, *p* < 0.001, and d = 0.23 (small effect size).

Figure 21. Pre–post change for stereotype "Men should not help with housework at home".

2. **Only girls should learn how to do housework.**

Playing Kiddo increased the number of students who disagreed with this statement (120 to 149, Figure 22). There is a significant difference between before (M = 1.7, SD = 1) and after (M = 1.5, SD = 0.9), t(209) = 2.1, *p* = 0.038, and d = 0.14 (very small effect size).

Figure 22. Pre–post change for stereotype "Only girls should learn how to do housework".

3. **Only men can use tools at home.**

Playing Kiddo increased the number of students who disagreed with this statement (100 to 139, Figure 23). There is a significant difference between before (M = 2, SD = 1.2) and after (M = 1.5, SD = 0.8), t(209) = 5.8, *p* < 0.001, and d = 0.4 (small effect size).

Figure 23. Pre–post change for stereotype "Only men can use tools at home".

4. **Only men should go out to work and women should stay at home and take care of the children.**

Playing Kiddo increased the number of students who disagreed with this statement (87 to 142, Figure 24). There is a significant difference between before (M = 2.2, SD = 1.3) and after (M = 1.6, SD = 1), t(209) = 5.8, *p* < 0.001, and d = d = 0.4 (small effect size).
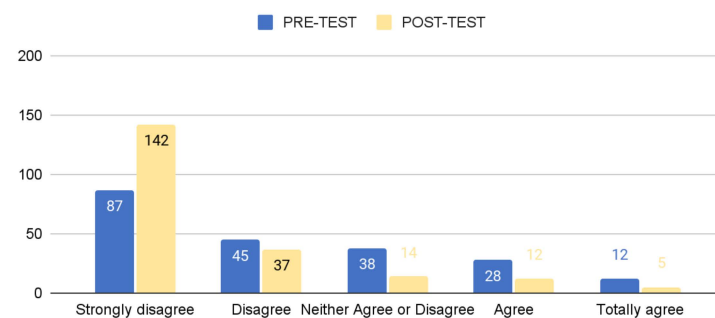
Figure 24. Pre–post change for stereotype "Only men should go out to work and women should stay at home and take care of the children".

4.3. RQ3. Do the Players Think They Learned About Gender Equality While Playing the Video Game Kiddo?

Perceived learning with the game was gathered via the post-test statement: "through the game, I have learned about equality". With a total of 210 players answering the post-test question, 33 of them consider that they have not acquired knowledge about gender equality through the video game, while 173 (82.4%) think that they have learned new aspects about this topic and 4 students remained neutral.

4.4. RQ4. How Long Do Players Take to Complete the Video Game Kiddo?

Results show an average play time of 39 min with 50% of the participants ranging between 33 and 48 min (Figure 25). The maximum play time was around 65 min, in which cases the gameplay was interrupted by the researcher due to the school's limited timeframe. Figure 25 also displays the differences by gender in the gameplay, showing an average 4-min longer play time in female players.
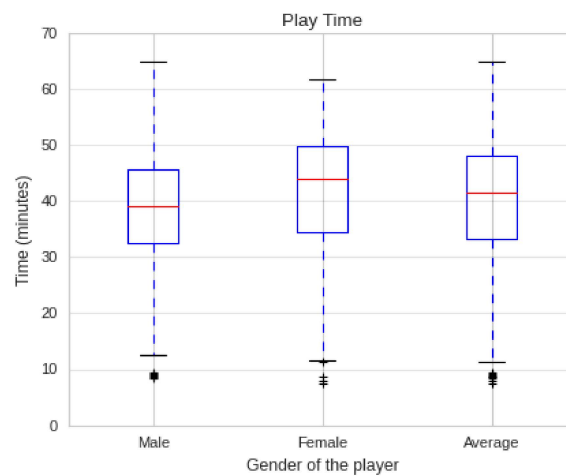

Figure 25. Play time of Kiddo for male, female, and all participants.

Therefore, an approximately 65-min session seems to be sufficient to complete the game. Additionally, in a study session, additional time would be required to apply both pre- and post-questionnaires, while in an application session in class, using Kiddo as a support tool for teachers, additional time would be required to then discuss the game, relate it with the course curricula, and discuss other gender stereotypes or, ultimately, any other class activities that teachers consider.

We can additionally explore how much of the game were players able to complete in that time. Game traces reveal that 128 players (61%) were able to complete the game (Figure 26, right side of the figure). These data do not exactly align with the self-report completion question of the post-test. Of the 210 players who participated in the game, 153 participants manifested in the self-reported question of the post-test that they managed to complete the game successfully, while 57 failed to achieve that goal.

Regarding the game chapters, Figure 26 also shows a general decreasing trend in their completion (from a 91% completion rate in Chapter 1 up to a 65% completion rate in Chapter 4). The completion rate per gender is also displayed in Figure 26 showing a slightly (6.7%) higher completion rate for male participants.
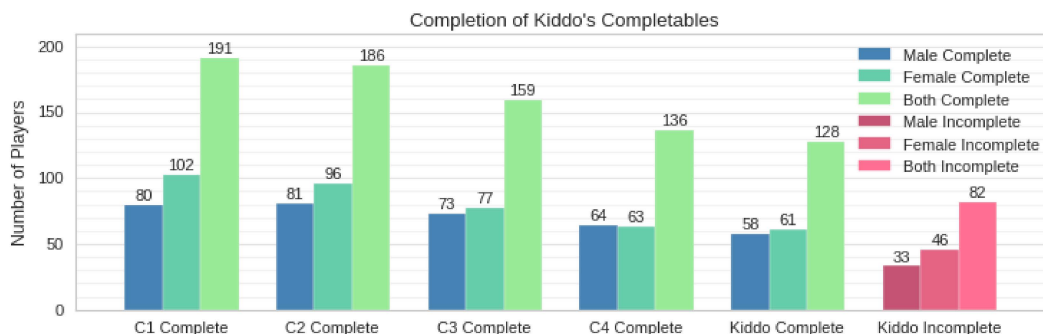
Figure 26. Number of players that completed each of the completables, including all chapters and the complete Kiddo game.

4.5. RQ5. Is the Video Game Kiddo Well Accepted Among Students?

Acceptance of the video game was analyzed from the results of the post-test statement "Activity with the game is fun". Of the 210 players who answered, 31 players did not find learning about equality through a video game enjoyable, while the majority of 171 players (81.4%) expressed that they did enjoy and found learning through this modality entertaining. The remaining eight players maintained a neutral stance on the matter.

When asked about what they liked most about the video game, the three most popular mentions were: "Learning about Equality", "I liked the whole video game", and "The characters". These aspects were highlighted by players as key elements that make the video game engaging and entertaining.

The players were additionally asked if they found the video game boring or interesting. Out of the total of 210 players, 180 players (85.7%) found it interesting because of its immersive story, 21 players found it nice regarding the "anime" type graphics, 6 players stayed away with a neutral opinion, 2 players mentioned that they found it boring, and 1 player mentioned problems reading.

4.6. RQ6. What Feelings Did the Video Game Kiddo Provoke in the Players?

Feelings were gathered through the open question "What has the game made you think about?". The video game has elicited a variety of feelings from players, including joy (44 players), happiness (47), and excitement (13), while others stated feeling sadness (50 players), anger (41), and feelings of inequality and discrimination (5).

During the application sessions there also were some events, among which stand out the comments of children identifying stereotypes at home, children mentioning that they experience situations of violence, or even male children who, after playing Kiddo, chose a pink souvenir because "the game taught them that colors are for everyone".

5. Discussion

5.1. Results Discussion

The goal of the Kiddo video game was to raise awareness of gender stereotypes for children in Mexico. Comparing results in the pre- and post-questionnaires for both sexist behaviors (4 statements) and gender stereotypes (16 statements, 4 statements corresponding to each game chapter) shows an increased awareness in all statements after playing the game. This positive impact aligns with previous results about the impact of games for social awareness [6]. The game also seemed to be well accepted by players, who found it interesting and joyful, which is one of the key aspects of using games, with the advantages that they bring, as a tool for learning [31].

In more detail, regarding the pre-and post-questionnaire statements about sexist behaviors, the largest change occurred in the statements "The man works, the woman

stays at home!" and "The woman is the one who should take care of the family!". The results also show the greatest change in two stereotypes presented in Chapter 4: "Only men can use tools at home" and "Only men should go out to work and women should stay at home taking care of the children". It is noticeable that all these statements are household-related and correspond to some of the stereotypes with the greatest prevalence in Mexican children [30]. This may be because gender stereotypes are beliefs and expectations transmitted from generation to generation within the family, and the way Kiddo addresses those topics has the greatest impact on players.

The complexity of the four Kiddo chapters and the challenges presented at each level were easy but required a specific amount of time to solve. However, we noticed that some players did not have enough time to complete the game. Since chapters were played in order, results suggest that players ran out of time as they progressed through the game. Nevertheless, there is also an increased complexity in the chapters, as it is designed in the game, which also contributes to this result. One of the possible causes was the slower-than-expected reading speed of players, which may have been impacted by the COVID-19 pandemic [39,40]. This was particularly noticeable in children under the age of 10, who may not yet have fully developed reading skills. For Kiddo, it is indispensable that the child knows how to read correctly, so these results suggest that the game may be better suited for children aged 11 years old or older.

We found no significant differences between male and female players (e.g., analyzing their responses to the game choices), with only slight differences in overall sexist behavior change (higher decrease in females), and game completion (higher rate for males). The highest difference was that female players took an average of 4 to 5 min longer to finish the video game. This suggests that there may be differences in performance or focus between male and female players in this game. It is important to account for these variations to create an equitable gaming experience for all players. This result may also be related to the fact shown by the literature that, overall, boys tend to play games from an earlier age, more frequently, and for longer times than girls [41]; therefore, they may be more used to their mechanics, etc., and advance faster than girls, although other studies have pointed out the lack of difference in play time between genders [42]. It additionally should be considered together with the previously discussed reading ability of children, which may influence these longer gameplay times. Besides this time difference, the game seems to have a similar impact and usability for both genders.

5.2. Limitations

A clear limitation of our study is that it was tested only in one school, due to the difficulty of accessing schools in Mexico, with the requirements before the game application and the time and equipment constraints. When planning studies that require access to public educational facilities in Mexico, it is first mandatory to request the corresponding permits from the educational authorities (DGOSE) and to coordinate with school personnel to optimize research time.

The school also had some equipment limitations: of the 30 computers available in the classroom, only 9 were in a suitable condition to apply Kiddo, requiring the use of additional personal computers from the researchers to avoid extending the stay in the school or the allowed time. The internet connection and the age of the computer equipment also impacted on the study, causing the game to experience some delays and drops in execution speed. These limitations affected the overall experience of the game and should be considered in future applications of the game in schools.

Additionally, the game applications were carried out under the supervision of researchers with minimal interference while occasionally assisting participants and providing

instructions on the sequence of chapters to be played. It would be necessary to test the validity of the game with no researchers' intervention. In this sense, it would also be adequate to carry out a future study with a control group (which was not possible due to logistical and time constraints), to compare its effectiveness with traditional or alternative learning methods.

5.3. Future Work

Having successfully implemented Kiddo in Mexico, the next step would be to take it to other countries with similar conditions, which could prove to be an important support for their learning processes and awareness of gender stereotypes. The translation of Kiddo into other languages would be necessary for its application beyond Spanish-speaking countries, while some of the gender stereotypes of higher prevalence could be adapted.

To ensure the success and relevance of serious video games in social contexts other than Mexico, it is important to expand analytics strategically. This would involve collecting detailed data on user interaction with the game, identifying behavioral patterns, and assessing the impact of decisions made in the virtual environment. For this, the availability of the game online would be crucial to ensure its accessibility to a wider audience. This would allow users to play at any time and from anywhere, thus encouraging greater participation and continuous learning, while collecting interaction data traces.

The mentioned comparison with control groups would allow us to obtain comparative data to analyze the impact of certain educational interventions in different contexts. In addition, collaboration with international educational institutions could enrich the study by providing a global perspective of the results obtained.

6. Conclusions

The video game Kiddo, which aims to raise gender stereotype awareness, was successfully tested in a school in Mexico with more than 200 students. The game has been praised for its ability to foster empathy and understanding among students by allowing them to put themselves in the shoes of others and understand the different experiences and challenges faced by people of different genders. Its positive impact on students makes it a valuable tool for promoting change in society.

The ongoing presence of gender stereotypes in society, with a higher presence in some countries, is a challenge that must be addressed to build a fairer and more equitable society for all. As stereotypes first appear at early ages, educational but entertaining tools like Kiddo become particularly relevant for equality education. Kiddo emphasizes the importance of allowing children to express their feelings and emotions healthily, without imposing restrictions on them based on their gender. It encourages empathy and understanding from an early age by promoting gender equality. While each chapter of Kiddo focuses on a particular gender stereotype, they all are part of the bigger picture of equality.

Integrating pre- and post-questionnaires and game learning analytics (GLA) data, we were able to scientifically validate the serious game while obtaining richer information from both the game (GLA data) and the external questionnaires to measure game impact. The study has answered the research questions about the acceptance and effectiveness of the game. Results show that Kiddo is a useful technological tool when it comes to raising equality awareness, similarly for both genders, and it has been well received by players. Kiddo is designed to be used as a support tool for teachers, as it is aligned with the content of the new gender equality textbooks in Mexico. We plan to continue with the use of Kiddo, and expand it beyond the context of Mexico, to extend its impact towards a more equalitarian society.

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