Bachelor Thesis

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Embracing Differences: Teaching Children about Diversity and Inclusion

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Abstract

Stereotypes are the most common way of expressing an oversimplified belief about a particular person or thing. Those views include, but are not limited to, stereotypes about personalities, appearance, and general abilities. Stereotypes can be either explicit or implicit, meaning that one is aware of a stereotype they have and that it is used to particularly judge (a group of) people, or stereotypes that are unconscious, meaning one is not aware of having them. Those beliefs are often conveyed to the younger family members by the older ones, sometimes subtly and sometimes not. As a result, this yields their presence in the classroom context too. This report describes the design of an application to trigger self-reflection and encourage kids to challenge certain unconscious biases present in the classroom. It does so by making children play an empathy game based on role-play scenarios. The final goal of the game is to contribute to the creation of a positive, bias-free, and diverse classroom environment, in which there will be no boundaries or stereotype-based biases.

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1   Introduction

Kids have a significant amount of biases, let these be conscious or unconscious. As a result, they bring them to the classroom, where they interact with other peers, with different looks, views, personalities, etc. However, interaction with other peers may lead to them externalizing those biases and ending up not respecting others. As a first step, our goal is to manage to identify those biases and the reason behind them. Following, to address those stereotypes and biases, an innovative game has been developed. This game adopts a unique and, at the same time, innovative and progressive strategy, to promote inclusion and empathy in the classroom context, and simultaneously discourage exclusion and certain biases. The game does not require any particular skills from its users, as it is based on a decision-making process, meaning the user has to choose between 2 possible answers to every question. The game should promote critical thinking and self-reflection, as with every question the user has to alternate viewpoints and acknowledge the positive and negative effects of each viewpoint. Those viewpoints include everyday real-life scenarios and stories, that promote equality between peers, mutual respect, open-mindedness, and mutual empathy fostering. The scope of the game though extends beyond the classroom context, as it is targeted for their future endeavors as well. Having cultivated skills such as mutual empathy and respect towards others' opinions and characteristics from an early age, will lead to their personal growth and enable them to become better, not only as an individual but also as a society as a whole. This Bachelor Project is thus targeted at designing and implementing a tool, in the shape of a game, for retrieving and reviewing any biases present in the classroom context. Building upon this understanding, a game is developed that will help in addressing those biases and that will potentially minimize their influence and will create a more inclusive and respectful environment.

1.1   State Of The Art

Although there have been numerous games developed and aimed at reducing such biases, such as Buffalo [1], Harmony Square [6], or Papers Please [3], there is still progress needed to be done. Although these games have made and continue to make a significant contribution to tackling the aforementioned issues, more effort is needed to fully address the complexities of biases and stereotypes in educational environments. Aside from the games, there have been initiatives from different organizations and institutes in order to promote diversity, empathy, and mutual respect in those school settings. One of those initiatives is also the intervention we performed, which allowed us firstly to retrieve the necessary data to assess the presence of biases and empathy in the classroom. Schools and in general peers are a major mechanism that plays a key role in the shaping of any potential biases. Moreover, it is widely known that people, in general, tend to group people based on some characteristic, let that be race, religion, occupation, etc. However, grouping people based on some characteristics like the aforementioned ones, fosters stereotypes, as certain traits are assigned to groups of people as a whole, just because they belong to the group they are categorized into. However, without any kind of intervention and/or prevention of externalization of those stereotypes, the preservation of stereotypes can lead individuals to believe in their validity and actively seek confirmation, without encountering any challenges to their sayings. On the other hand, though, there exist people who claim to be unbiased, yet their sayings prove the opposite, even if they are not aware of it. In this scenario, we are talking about implicit biases, which essentially are biases possessed by a person, without consciously acknowledging them. Those can be considered the most troublesome, as the person is inadvertently expressing them, oftentimes with consequences greater than in the case of explicit biases. Implicit biases are easier to be developed and acquired, as they can be perceived through many everyday scenarios, let that be the media, the peers, or the society in general. Many measures have been acquired to tackle those biases, let them be explicit or implicit. The use of technology is a major tool that can help in identifying them, and consequently mitigate them. This is what this project is about, to design a game as a means to trigger reflection on empathy and mutual understanding in the school context, and in the whole societal context at a later stage. In addition to technology's development and advancement, more measures have been taken to solve such problems, such as inter-group collaboration, with the ultimate goal of the interaction and achievement of a common milestone between people with different and diverse backgrounds. Moreover, a vast amount of school units have begun to adopt and host campaigns and workshops which have as a main focus the education of children as per the impact biases can have on other individuals and society as a whole. A combination of the aforementioned techniques needs to be performed, in order to guarantee an equal, bias-and-stereotype-free future and society.
As a result, using those data we create a game that shall tackle those biases and promote mutual empathy and understanding.

1.2   Objectives

The bachelor project is divided into 12 iterations, with an equivalent number of milestones. The 12 milestones can be categorized into 3 groups, with the first one containing extracting the user requirements with game-like activities, followed by the design of the game and its actual development, concluded by the evaluation and testing of our product. The project is based on constant classroom interaction. We are using technological tools, in the shape of collaborative design where children play the roles of informants, co-designers, and expert evaluators, to mitigate gender stereotypes in the classroom. We involved children in a field research study to get a general idea about the biases present in the classroom and to make them align with our game design. A game has been designed in order to raise awareness of any possible stereotypes. Playing such a game, children will be able to put themselves in each other's shoes and promote empathy, which shall provide them with mutual understanding and realize the effect of unconscious biases. While the product is being developed, it goes under constant testing, while at the same time, gathering constant feedback. Essentially, the project follows a formative evaluation approach, meaning the product is constantly assessed and improved as per provided feedback where needed while it is still under development.

1.3   Study Description

The goal of this project is to create a game, that shall be used in order to mitigate stereotypes present in the school context. The project is carried out over different weeks, with the first ones including classroom interaction that shall provide useful insights in determining the game's storytelling [4]and mechanics. Classroom interaction is a beneficial tool in performing the required user assessment so as to improve as much as possible the final product. The logistics of the project, as mentioned previously, include an intervention that took place on the 28th of March. For the interaction phase with the students, observation grids [11] were used to annotate the attributes the children were assigned and the respective feedback. Notes are taken individually, meaning the data provided by each participant should not interfere or be merged with others' data, as that shall introduce inconsistencies in the feedback received for the creation of our product.

The interaction activity was used to gather broad observations on how the kids respond and react when put in someone else's shoes. This helped us in observing also existing gender biases. Our goal was to focus on observing reactions and interactions among the children and at the same time, any occurring biases that may influence those reactions and interactions. Assigning certain personality traits to a certain person can bring on the surface biases that relate to children's behavior towards that personality trait. Essentially, the goal of the children was not to try identifying the assigned label, but to rather look at how the game logistics shall be organized by them, for example, how will they choose the character they were supposed to play. The children were also asked to interpret their assigned characters. This activity gave the potential to derive an observation regarding the reactions and interactions of children when they are treated in a different way and asked to wear somebody else's identity.

The labels were defined and assigned to students by experts with pedagogical backgrounds so that any kind of inconvenience is prevented. The experts were assigned by the institution in which the interaction with the children shall take place. Apart from assigning the labels, the experts' team was also responsible for explaining the game's logic and functionality to our children. The aim of our simulation game was to challenge those stereotypes. The stereotypes can be derived based on the children's approach to the labels game, meaning how they interpret and react to the content of the labels. By taking these stereotypes into account, we can create a more effective game that promotes empathy and challenges stereotypes.

Our project adheres to the collaborative design principle, meaning multiple people with different and diverse backgrounds, different skills, and approaches, collaborate together towards the development of the product. Moreover, the project follows a formative evaluation approach, meaning the game undergoes constant testing, while still under development. The development of this project adheres to the scrum methodology, which involves constant teamwork and communication, and the incremental building of some project features. Every member focuses on constant improvement and excellence in the delivery of the product to their children. The excellence in delivery shall be represented by a well-established and at the same time, well-polished, user interface.

For the theoretical part, observation grids have been designed in order to receive user feedback that shall aid in the creation of our game. For the practical part, for the working prototype, Figma was used. The aim was to create sketches of the game and have a fully-working prototype that aligns with our users' needs and expectations.

2 Project requirements and analysis

As already stated, this bachelor project is divided into 2 parts, a theoretical part, conducted during the first 2 months of the semester, and a practical part carried out during the remaining 2 months. The theoretical part includes activities such as game-like scenarios, gathering user data, user assessment, the intervention, and as a last step, the requirements' extraction. For the practical part, paper prototypes were drawn as a starting step, followed by an in-depth analysis of the game mechanics, the development of a navigation map that displays the gameplay evolvement, and most importantly, the implementation of the game itself. Throughout the last part of the practical phase, the game is continuously adapted and improved as per valuable received feedback from my professor, her assistant, and a panel of invited experts. Their input served as valuable guidance towards the constant improvement of my product.

2.1 Theoretical Part

The theoretical part kicked off with an actual discussion about the product we intended to build. During these initial meetings, we discussed the objectives, parameters, and expected results of the project. We created a solid basis for the subsequent theoretical and practical work that had to be done. As a next step, after thorough and extensive research, we designed several game-like activities, which the children could engage in during our intervention. As a result of this meeting, the decision was made to acquire the Cinderella story [9] as a reference game for the children to engage with during our intervention. Subsequently user data and in general the project logistics were communicated. Effectively, the children were from the primary-five class. The number of children amounted to 24 and was equally distributed to the total number of team members. The meetings involved school interaction, and more specifically, a one-hour gym interaction. The theoretical part continues with the actual intervention. After the intervention has been performed, the theoretical phase concludes with the extraction of user requirements, essential for developing our product, as they capture all the necessary components to be incorporated into our application.

2.2 Intervention

As stated previously, the intervention took place on the 28th of March and was performed in a school environment, as already agreed. The number of groups and their members was not as many as planned originally but that did not prevent us from performing the intervention successfully. This yielded some original trouble in the beginning, regarding the sudden change of logistics on our project. The school teachers also aided in not having trouble while performing our intervention, in assigning the inverse labels to each of the children, taking into account their personality traits. The topic that was assigned to the students was a Cinderella fairytale. The intervention started off with the teaching team actually reading the fairytale to the students, and after that, explaining to them how the game shall be organized and performed. In the meanwhile, the groups had already been formed and separated, according to the teachers' discretion, while at the same time being assigned labels, taking into account their personality traits. The 24 present children were divided into 6 groups of 4 people each. The note-taking process during the interaction was facilitated using observation grids. An observation grid is a fast and in particular effective way of taking notes at a high volume and writing little amounts of text. The observation grid looked like this:

Participants	Personalities	Gender Characteristics	Emotions	Actions	Props
Student 1	Introvert	Shy & Understanding			Crystal Shoe
Student 2	Extrovert	Outgoing			Prince's Crown
Student 3	Organizer	Consistent			Tower Clock
Student 4	Spontaneous	Clever/Inspired			Pumpkin

Table 1. Observation grid

The intervention was a helpful milestone that aided in firstly understanding the biases present in the classroom context. Effectively, role-playing the Cinderella game, in alternating roles, would reveal a vast amount of stereotypes. These stereotypes and biases were captured, gathered, and grouped accordingly for easier requirements extraction.

As a final step of the intervention, we held a reflection stage, both a group-wide reflection and a classroom-wide final reflection. During the group reflection, the kids suggested some changes in the logistics of the game, such as providing a greater number of personality traits and allowing them to choose from a greater variety of options. However this at the same time would require increasing the number of people in each group. Moreover, better communication regarding the game logistics was suggested, such as confusion, tension, and misunderstanding were present during the role-play. At the end of my group intervention, I asked which of the girls were perfectly fine with being assigned an opposite-gender role. Both of them were okay with it and said they loved it as they could see a different aspect

of themselves and their personalities pictured using a simple roleplay. On the other hand, both boys felt inconvenienced especially when being asked to perform the shy (Cinderella) role. They claimed it was inconvenient and they mentioned that this role should be assigned to girls only. Therefore we can see that gender stereotypes were present, specifically for boys.

Following the conclusion of the group interventions, we proceeded with a classroom-wide discussion led by a member of the research team. During this session, kids were asked different questions regarding any potential changes they would perform, their feelings towards the predefined and preassigned personality traits, their confidence level, and whether they would pick a different role than the one assigned to them. The meeting came to an end by asking a handful of significant questions, such as their comfort level with being assigned a role that is not traditionally associated with their gender. Out of 25 individuals, around 5 girls expressed their positivity, giving us an approval ratio of around 40% among the total of the girls, whereas, for boys, 4 indicated their approval of being assigned the princess role, giving us an approval ratio of 30%. This highlights the fact that the stereotypes are vivid, and are more present in boys than girls, in this particular context. Lastly, several objections regarding the roles assignment were raised, while there were also kids stating that their performance would be better had they been assigned a role that suits their personality. Others felt uncomfortable being assigned a role a specific role, and another group stated that being assigned a role outside their comfort zone, helped them gain an understanding of how one feels when treated as such.

2.3 Requirements Extraction

The theoretical part of our application is concluded with the process of extracting the requirements needed for the game design started. After carefully going over the observation grids we used to take notes during the intervention process, we gathered all the important data helpful in designing our game. To accomplish this, we utilized a Word Activity Affinity Diagram (WAAD) which we populated using the notes extracted during the intervention. A WAAD can be viewed as a tool that can be acquired to solve different problems based on group work. As such, the process of creating the WAAD started with a typical brainstorming session in which we all brought the data we extracted during our intervention. Those notes were grouped into distinct clusters. The clusters typically included game characteristics, kids' emotions, and our focus on developing a game that would aid in building their profile. The notes have been clustered into the three aforementioned categories. Those clusters provided us with insightful feedback helpful in deciding our user requirements and as such the game's design. As such, after careful consideration, we managed to extract eight user requirements, valuable towards the creation of our product.

As a starting point, we defined the mechanics of the game, and as such, we agreed on utilizing the Hero's Journey structure, which is a well-established pattern, mainly used in user requirement extraction and game design scenarios. The Hero's Journey serves as a narrative pattern that guides players through a sequence of challenges and obstacles that if completed successfully lead to the accomplishment of a final goal. Our goal while using the Hero's Journey is to captivate our users with an exciting game story and at the same time provide them with a pleasing gameplay experience.

Additionally, we agreed on creating an educational game, that given a series of obstacles, will provide the users with a sense of learning something new, in terms of empathy and mutual understanding. The game shall have a friendly user interface for easy navigation and less confusion. As such, a non-playable character (NPC) is acquired to provide subtle hints and useful information during the gameplay. The NPC's role is to teach players that making mistakes is perfectly acceptable, but also to provide them with information regarding the game logistics and scenarios, or the consequences of certain choices performed by them.

The third requirement derived was storytelling. We believed that storytelling would be an appropriate way to get the players immersed in the gameplay and at the same time get their attention. The game flow should focus on providing a pleasant experience for its players, while at the same time teaching them about different personalities and kinds of stereotypes.

We also decided on incorporating a reward system. A reward system essentially will compensate the users with an in-game item (let that be a heart or something similar) for every correct answer. The goal of the game is to collect an amount of hearts that is equal to the total number of levels. We believe that the incorporation of a reward system as a motivational tool will encourage the players to remain engaged during their gameplay. The introduction of rewards shall provide a greater sense of motivation to the players in order to actively progress through the game levels, while at the same time minimizing any potential disinterest signs.

Another requirement regarded the usability of the game, as we decided that the game shall be a single-player one. Dealing with emotions and different personality traits is often a challenging thing, and thus we would like to avoid uncomfortable situations between different individuals, while at the same time promoting mutual understanding and empathy about others' personality traits.

Following we decided that for the gameplay we should focus on creating the levels' gameplay based on concise questions and answers. Given the fact that kids tend to favor minimalistic designs and scenarios, we concluded that keeping the questions in a short and concise form would be an effective technique to maintain their engagement without encountering boredom signs. The questions being straightforward are considered as a means to capture their attention and maintain them focused throughout the whole gameplay involvement.

Another requirement extracted is that the game, throughout its whole duration, should in general have a positive tone, meaning it should promote positive real-life scenarios without any negative consequences. Given the fact that the game is targeted towards kids, we concluded that a pet care game would be an optimal idea, as it fosters only positive scenarios. Having to focus on taking care of a virtual pet, a positive and wholesome experience is guaranteed for the players, while at the same time fostering mutual understanding and minimizing any biases.

Last but not least, to enhance usability, we took into account the fact that the main language spoken by the vast majority of the kids is Italian, we translated the dialogues of the game from English to Italian. This decision was taken so as to provide a pleasant user experience even for those who are not very familiar with the English language. Offering the game in both the native language but also English, we aim to give kids the chance to fully enjoy the game without having to overcome any language barriers.

3 Project design

3.1 Ideation

The application's practical part begins with the ideation phase. The main goal of the ideation phase was to brainstorm and collect ideas that correspond to finding an appropriate game scenario and structure that would satisfy our users' requirements. The ideation phase comes after we have extracted our users' requirements, as the main goal of this iteration was to find an appropriate game scenario that would be targeted towards kids and prevent any negative or inconvenient scenarios. Due to this reason, we agreed on building a **pets game** in which the users, which in our case are the kids, are tasked to answer five questions regarding pet care. Taking into account that the game is targeted towards kids, we believe that the chosen scenario is a good choice as it does not promote any negative or offensive scenarios. Having chosen the game topic, led to us brainstorming about the game structure and flow. We concluded that the game should assign a pet that corresponds to the inverse of each character. As a next step, the user would be shown a question regarding the pet assigned, and try to figure out the opposite answer to what their personality trait indicates. The available pets are also four, and each of them, based on their behavior, is mapped to one of the four traits. In the ideation stage, we also came up with the idea that we should design also a quiz, playable at the end of the game, in which the user can test their gained knowledge. For the incorrect answers, we decided to help them by giving out hints. A general idea about how the game evolves can be found in the navigation map [7].

3.2 Miro

As seen from the title of this subsection, we also used Miro [10]. Miro is a platform in which users can collaborate and share ideas using tools such as sticky notes, diagrams, etc. Users can cluster their ideas into different groups, helpful for requirements extraction and game design scenarios. In our case, the Miro board looks like this:


Figure 1. Miro Diagram

As seen from the image above, our observation grid notes have been clustered into 3 groups. The common characteristic between the elements of the first group is that they all give a general idea or feedback regarding what should the game look like or what features should it have. The second cluster groups the section of the notes that

mentions any potential feelings expressed during the intervention. Having an overview of the feelings expressed by the kids helped us actually understand that when building our game, our questions should be relatively short so as to trigger their attention. Lastly, the third cluster's notes led to us understanding that the game should trigger their curiosity, and to achieve this, we decided our in-game characters to be pets, which the kids will have to take care of. Effectively, the three clusters are divided into three parts each, with the yellow notes on the top indicating what the cluster outlines, the middle one indicating the relevant information and data retrieved from the observation grids, and the bottommost cluster containing useful conclusions drawn which are to be taken into account when designing our product. Clustering the intervention data ensures a clear organization of all the available information, aiding when incorporating our changes while in the product design stage.

3.3 Navigation Map

As a next step, a navigation map [14] has been implemented and is visualized below. The navigation map is a flow chart that shows how the game evolves in each scenario. It is used as a tool for the facilitation of the design of our application as it provides a rough idea of the game overview and possible game scenarios and outcomes. It is a useful kit as it can be acquired to create the game's sketches. As a reference, the navigation map has been created using Draw.io [2].
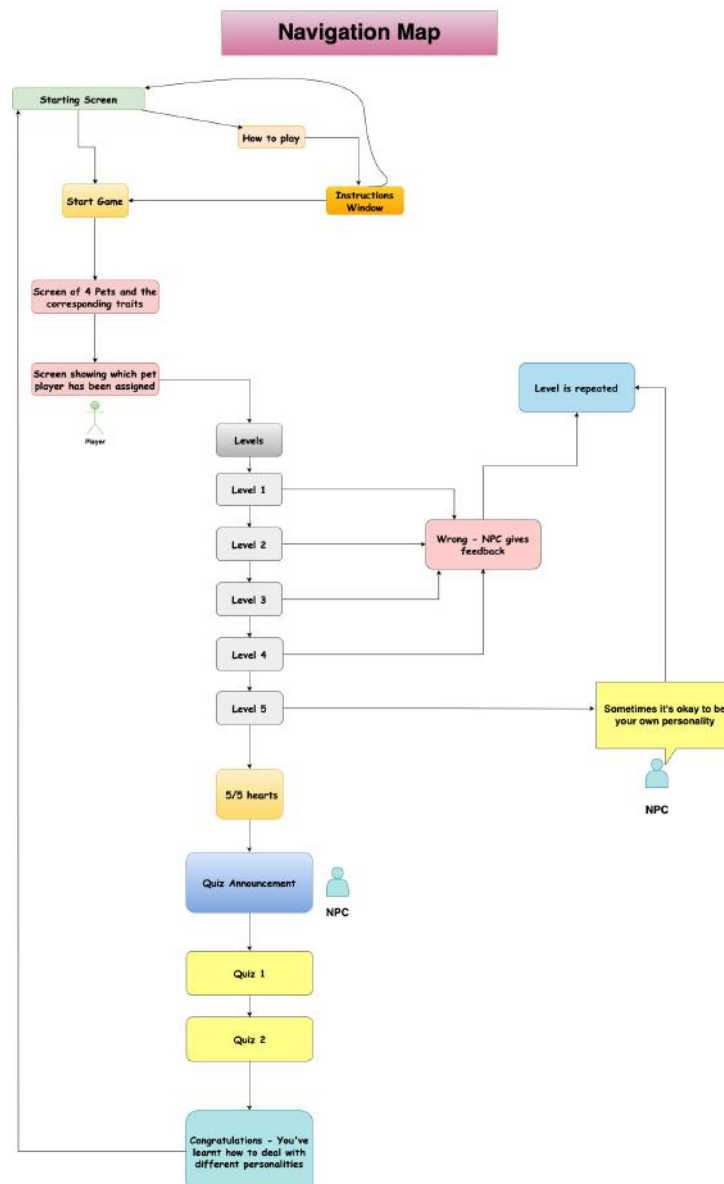
3.4   Sketches

The practical part of our application kicks off by designing our game using sketch prototypes. In this way, we are given a basic idea of what our application will look like, and are helpful in the initial stages of conceptualization. Those sketches allowed us to get a rough overview of the structure and design of our game. A sketch for the components (starting screen, instructions, levels, final quiz) of the game has been created are all visualized below.

The game starts with an initial screen that provides the user with two options: playing the actual game or reading the game instructions.

Figure 2. Starting Screen Sketch

The game instructions consist of two screens, in which all the game logistics are stated.

(a) How To Play I
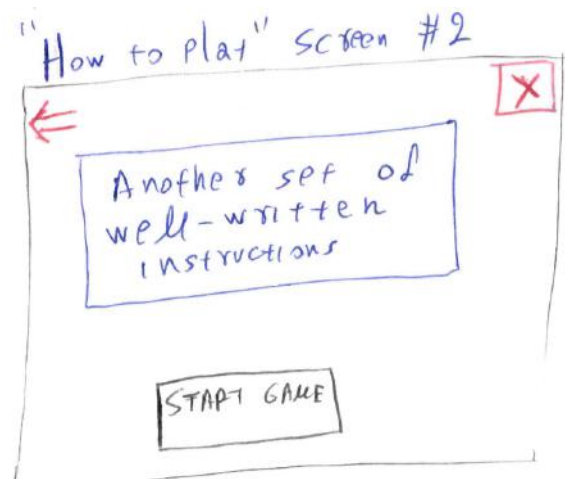
(b) How To Play II

Figure 3. *How To Play* Screens

In the next stage, the user is prompted to choose a trait that they believe fits their personality.

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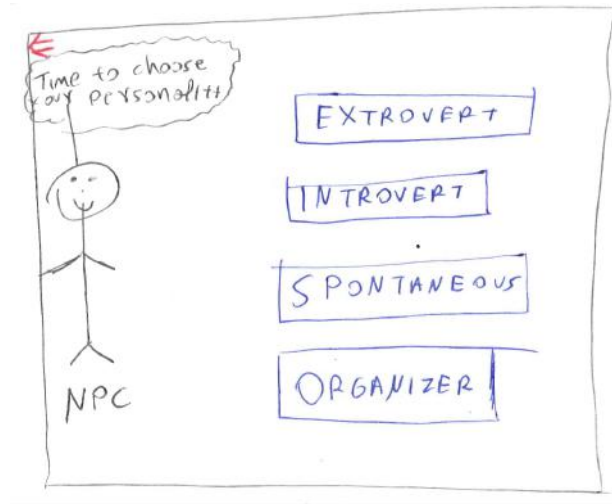
Figure 4. Personality Selection Sketch

Following this, the game assigns the user a pet that corresponds to the opposite of their personality.
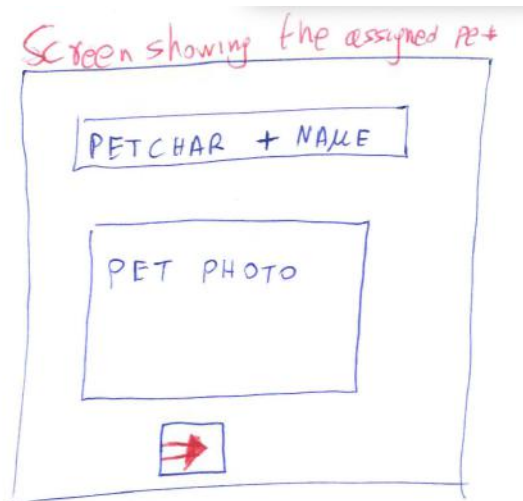
Figure 5. Assigned Pet Sketch

Upon entering the gameplay phase, the user is presented with the first question and is prompted to choose one of the two displayed answers. Failure to select the correct option will display a window, in which an NPC shall provide a hint about the correct answer.
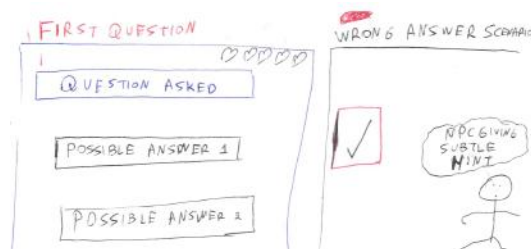
Figure 6. Question I Sketch

For questions 2, 3, and 4:
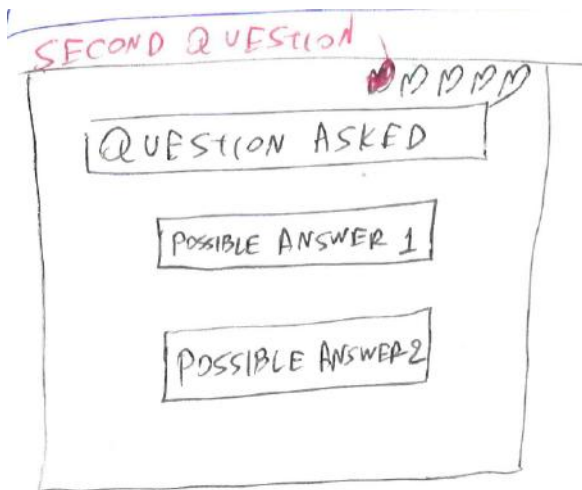
(a) Question II Sketch
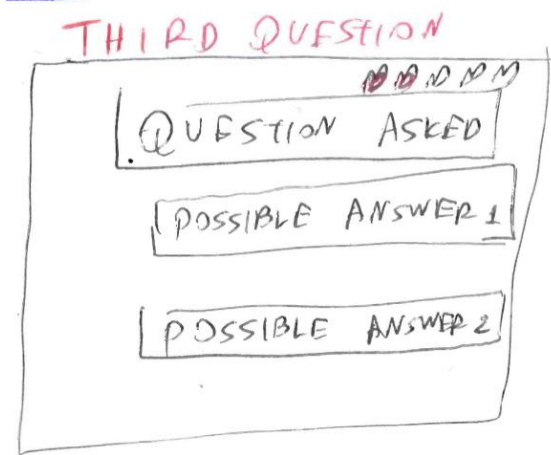
(b) Question III Sketch

Figure 7. Questions II, III Sketches
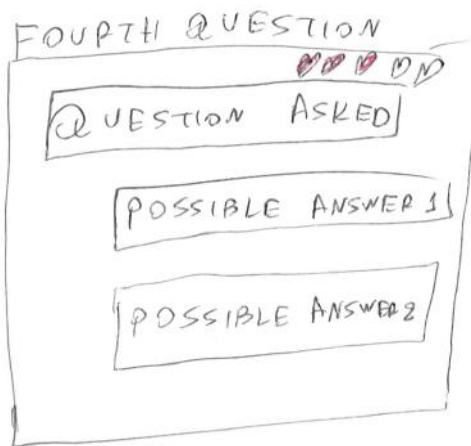
Figure 8. Question IV Sketch

In the last question, the only change is that in case of a mistaken choice, the NPC encourages the player to choose the answer that corresponds to their personality, not the opposite.
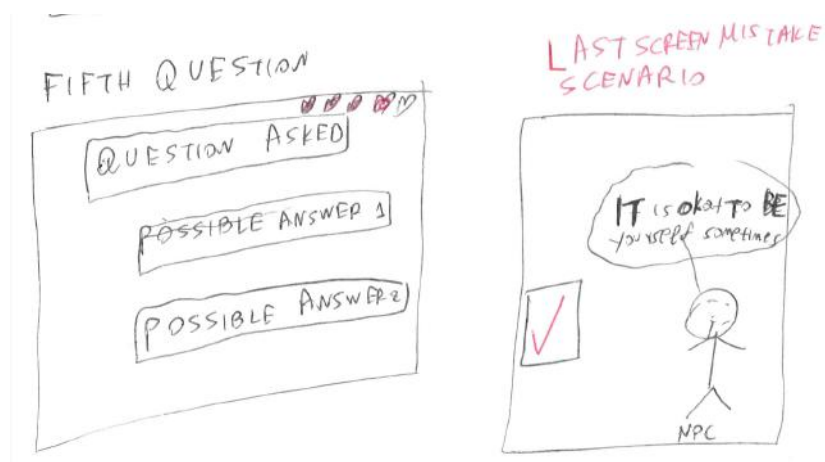
Figure 9. Question V Sketch

After the user has successfully answered all the questions, they are prompted to take a quiz so that they can reflect on what did the quiz actually teach them.
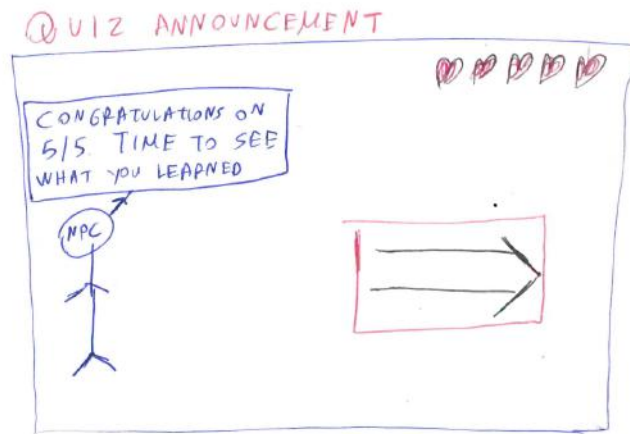
Figure 10. Quiz Announcement Sketch

The quiz has been decided to be shorter than the actual questions, as the goal of it is not to teach something new, but to actually make the kids reflect on their choices. The sketches corresponding to the quiz are depicted below:
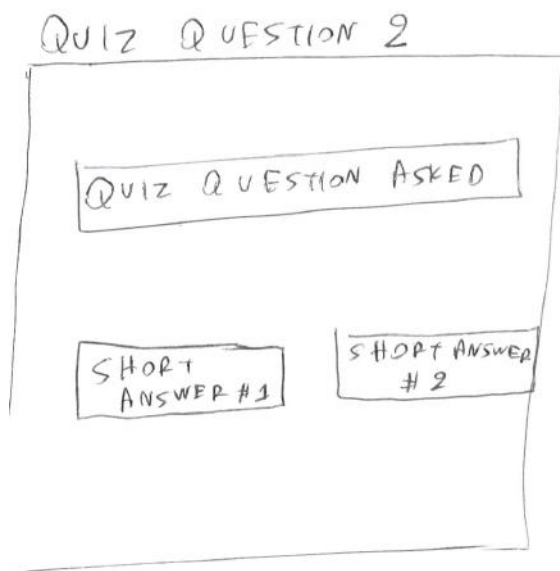
(a) Quiz Sketch I
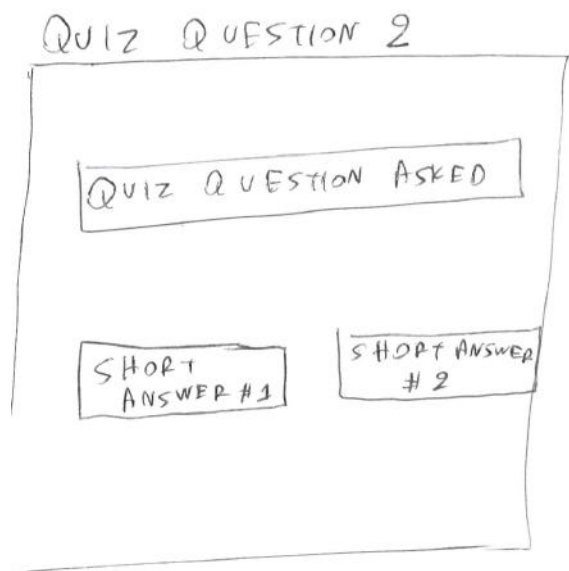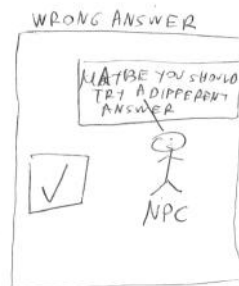
(b) Quiz Question II

Figure 11. Quiz Questions

Figure 12. Quiz Mistake Sketch

As a last step, the NPC congratulates the user on having completed the quiz.

Figure 13. Final Screen

4 Game

4.1 Game Technicalities

After the navigation map and the game sketches have been developed, we continued with the actual game and the gameplay. Given the short available time span, we decided to go for a game that does not require actual coding using some game engine. After thorough and extensive research on various game-developing platforms that could handle all the complex use cases and scenarios of our game, we agreed on using Figma. Figma is a collaborative web application for interface design, that is aimed mostly at designing prototypes about how a game/service/application is supposed to behave on certain triggered event listeners. Alongside Figma, we acquired a formative evaluation approach, meaning the product is continuously being tested while still being under development, collaborative design as many people with diverse backgrounds collaborated on the creation of this project. Last but not least, we follow the scrum methodology. As previously mentioned, we deliver features in 2-week iterations, as scrum is a framework used mainly for project management that fosters teamwork, accountability, and iterative progress toward a well-defined goal. We use Scrum's manifesto, meaning we start from the few things we know in the beginning, extract data by receiving feedback from our users, and after that readjust the process and iterations where necessary. As such, a communication and collaboration environment is promoted, which is a must for the design of such products.

4.2 Goal Of The Game

The primary goal of the game is to foster empathy and mutual understanding in the school context. As such, when the player chooses their personality trait, we decided to assign to them an animal that corresponds to the exact opposite of their character. For example, if a player chooses an introvert trait, they shall be assigned an extrovert pet, in this scenario, a dog. However, this does not stop here. Once the player is redirected to the questions, we decided to mark as correct the one that is the opposite of their character. In this scenario, we try to promote empathy and understanding towards others' opinions and views. Henceforth, when a player picks an incorrect answer, the NPC (non-playable character) gives them a hint about what they are supposed to pick. When giving hints, we agreed on not explicitly saying *your answer is wrong, pick another one*, but give a subtle indication about what the correct answer is. On the other hand, this may raise much confusion for the user, and as such, we decided for the last question, to mark the actual correct answer as the correct one, indicating that sometimes it is perfectly normal to express yourself in the way that they feel and their personality trait indicates. We hope that using this format, the player shall be able to put themselves in someone else's position, but at the same time highlight the importance of being themselves. A similar format is followed for the end-game quiz, except that the users are asked to answer two questions, and in which the correct answers are the opposite of what their character indicates. From the player's perspective, the goal is to respond correctly to all the provided questions. Given something like that is done, we can claim that the user has developed a profound sense of mutual understanding and empathy towards different personalities.

4.3 Game Rules

The game environment is defined with levels [8], where each level contains a specific question that the player needs to answer. Each question will have two answers, one being the correct (opposite choice) and one incorrect (expected choice of their personality). An NPC (non-playable character) is present once the game starts and helps in navigating the game in case guidance or additional help is needed. If an incorrect answer is chosen, the NPC reminds them that their answer should be reconsidered. On the contrary, if the correct answer is chosen, the NPC issues a virtual reward, shown in the top-right of the screen. If a player chooses the correct choice, they will be navigated to the subsequent level, in which a different question is asked. A similar pattern is followed for the rest of the levels and questions. In each level, the player is prompted to choose the opposite answer compared to their predefined character. In the last level, the player has to choose the answer representing his character. If this is not met, the NPC intervenes and encourages the player to pick the answer corresponding to their personality trait.

Once the player finished the last question they were prompted to take a personality quiz to reflect on their behavior. This might or might not have a positive effect on their personality trait but will encourage the player to feel empathy towards people who have an opposite personality of their own.

4.4 Game Flow

The game unfolds as follows: In the beginning, the player is located on the starting screen, in which there are two options available, including amongst them proceeding to the game itself and reading the game instructions.
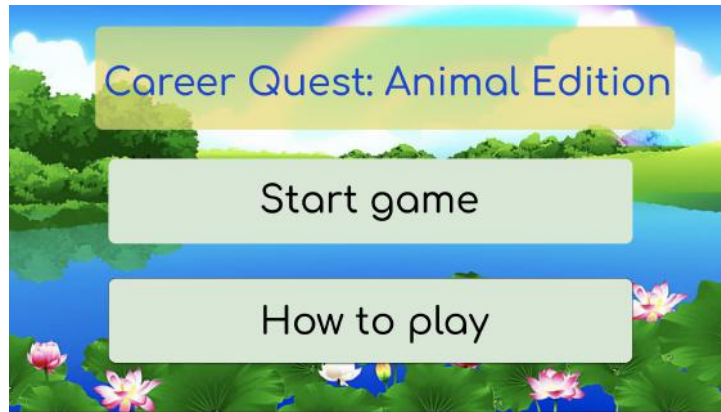
Figure 14. Starting Screen

The game instructions are divided into two pages. Opting to read the instructions leads to a screen containing a window stating the first set of them and an option to move to the second set of instructions. Once the player is acquainted enough with the game instructions and mechanics, they can choose between returning to the starting screen or starting the actual game by clicking on the start button.
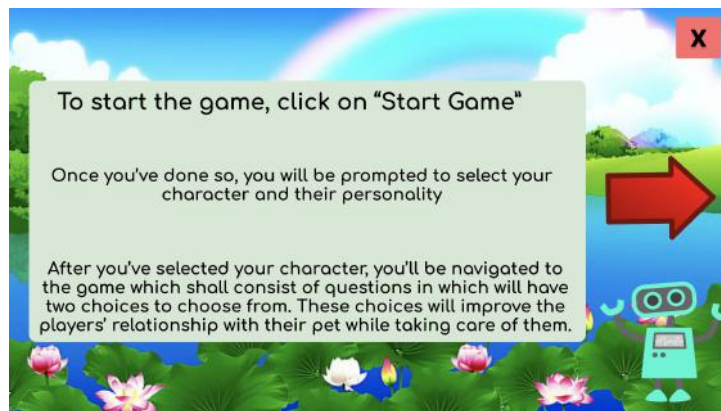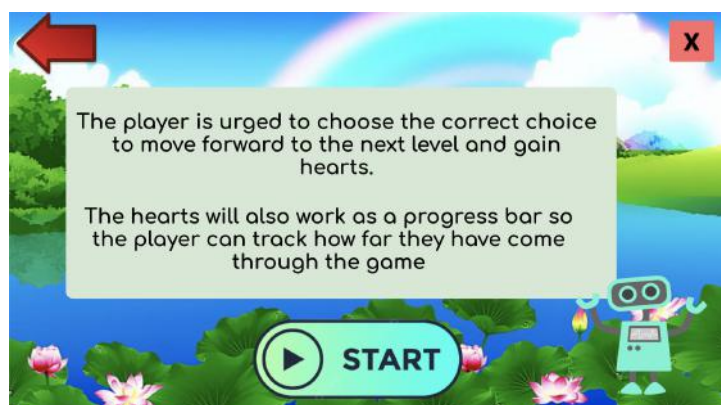

Figure 15. Instructions Screen I

Figure 16. Instructions Screen II

Once the player chooses to start the actual game, they are presented with four different options/personality traits to choose which one of them describes them best. As stated previously, the player is assigned a pet corresponding to the opposite of what their personality suggests, so as to promote and foster empathy scenarios and at the same time minimize any possible presence of stereotypes.
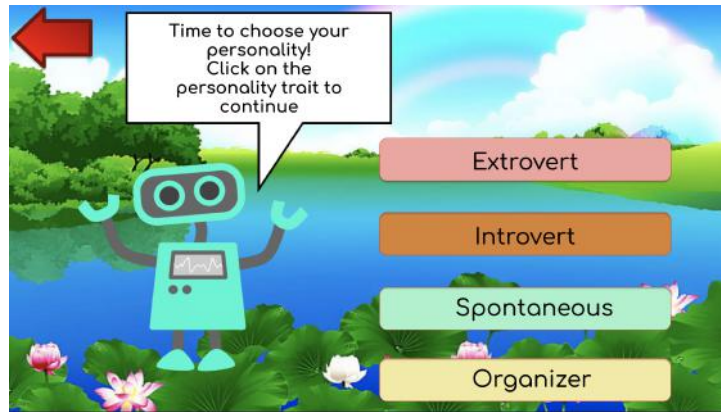
Figure 17. Personality Traits

Once the user chooses the personality that suits them, they get assigned a pet they will have to take care of. The choice of the pet is made in contrast to the personality trait of that individual. For instance, an introverted person will be assigned an extrovert pet to take care of, such as a dog.

Figure 18. Pet Assignment

After this point, the actual gameplay kicks off and the user is presented with the first question, alongside two potential answers, based on the personality trait chosen and the assigned pet.
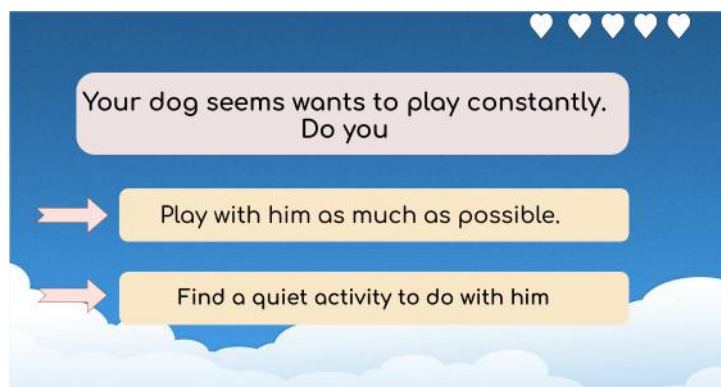
Figure 19. Introvert Question I

In case a wrong answer is chosen, the NPC pops up and responds with a subtle hint indicating the correct answer.
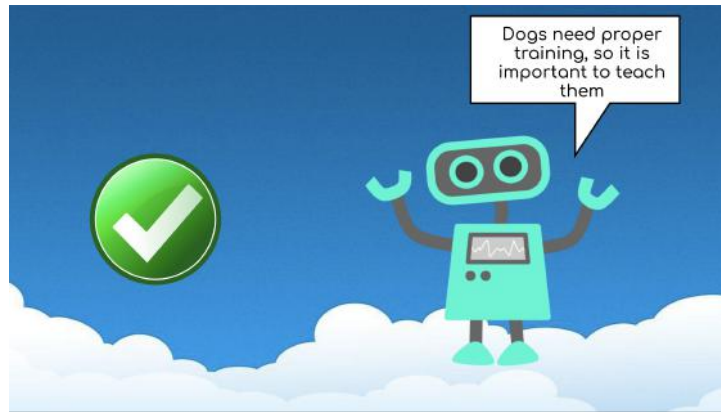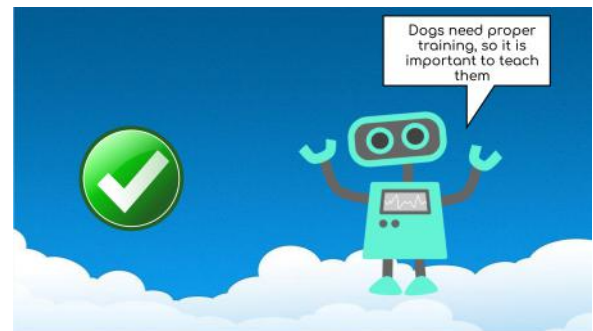
Figure 20. Wrong Answer Scenario

If a correct answer is chosen, the player is forwarded to the next level, containing again a new question and two potential answers.

(a) Introvert Question II

(b) Mistake Question II

Figure 21. Introvert Question II

This flow is repeated five times in total, for each of the respective personality traits. It is worth stating that a player cannot move to the next level if an incorrect answer is picked, thus careful consideration, critical thinking, and literature are required to advance levels. The rest of the questions are depicted in the following section.
The third question and its respective mistaken-answer scenario are visualized below:
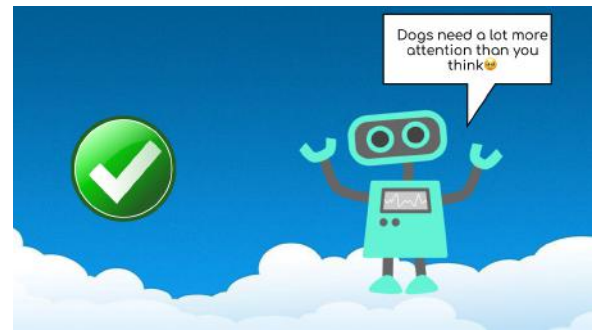

(a) Introvert Question III

(b) Mistake Question III

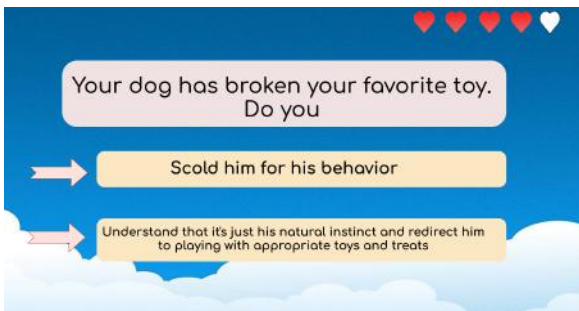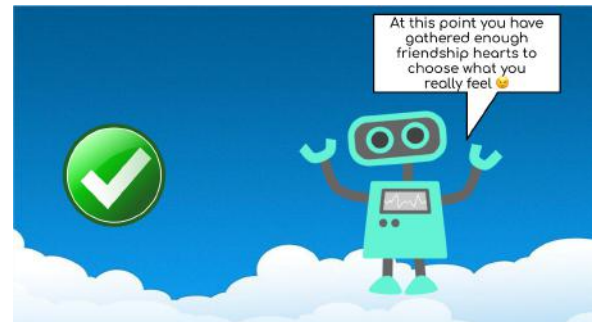**Figure 22.** Introvert Question III

16

(a) Introvert Question IV

(b) Mistake Question IV

Figure 23. Introvert Question IV

For the last question, as previously mentioned, the user is supposed to choose the answer that corresponds to their character trait, and not the opposite. Henceforth, if a mistake is done, the NPC intervenes, notifying the user that they have gained enough information to decide based on what they actually feel.
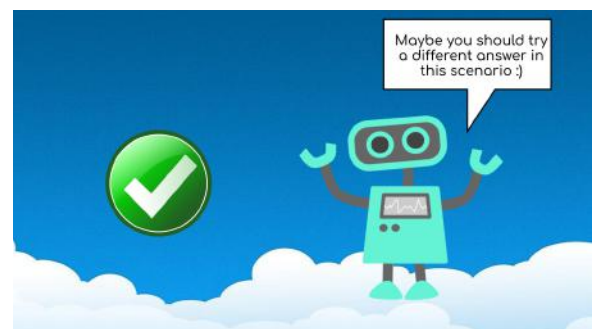

(a) Introvert Question V

(b) Mistake Question V

Figure 24. Introvert Question V

After successfully answering all the questions, the player is given the opportunity to participate in an interactive quiz, allowing them to test what they learned. The quiz is shorter than the actual questions, as the goal is not to teach but to review learned knowledge, gained by the actual levels gameplay. The answers are limited to yes/no or one-two word scenarios. The quiz is visualized below.
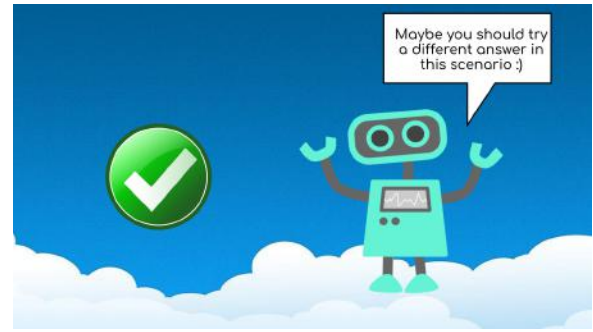

(a) Introvert Quiz I

(b) Mistake Quiz

Figure 25. Introvert Quiz I

(a) Introvert Quiz II

(b) Mistake Quiz

Figure 26. Introvert Quiz II

After the quiz ends, the player is rewarded with a virtual gift, non-redeemable though.
In the end, the player is given the option to restart the game.

Figure 27. Introvert Game Over

The other 3 scenarios (extrovert, organizer, and spontaneous traits) can be seen in the Appendix.

5 Issues

While this bachelor project was progressing, we came across several issues. Those issues included, but were not limited to, the game deployment, the platform in which the game would be designed, or even the intervention itself.

5.1 Intervention I

During the intervention performed in Muzzano's high school, we mainly came across some organizational problems. In essence, the number of children was greater than we expected, thereby leading to some of us having to manage and perform role-plays with more than one group.

5.2 Intervention II

Another issue that arose during the intervention was related to the spoken language. Despite being assigned to an English-speaking group as non-Italian speakers, the kids would switch to Italian-speaking frequently, thereby making it challenging for us to understand their sayings.

5.3 Game platform

One of the significant difficulties we faced during the past months, and specifically during the development of our game was, picking the platform and how to implement the game. First, we investigated game engines such as Unity and Unreal Engine. They would have given us complete control over the game mechanics and visuals. However, creating our first interactive prototype would have taken far too long. Then we examined game development tools

such as RPGMaker [12] and GDevelop, which provide a simplified environment for creating video games. However, due to the relatively poor graphics offered on their free tiers, we decided against using them. As a next step, Scratch was proposed. Scratch is a block-based programming language, aimed at kids, in which the users can play a proposed game using their keyboard. However, given the fact that scratch requires explicit use of the keyboard only, and cannot be played from mobile devices, we rejected this option too, which led to us choosing Figma as our last alternative. With Figma, we can create screens for all possible kinds of game scenarios, user inputs, and event listeners. As such, a game can be made by designing and developing screens for all kinds of game occasions, thereby giving us the closest approximation we could build to a real game.

5.4 Sound Integration

Adding sound effects that read the text for people with difficulty in reading the dialogues present in the game. However, this was a challenge for us as Figma has limitations in adding sounds. Specifically, it does not allow sound integration by itself. We experimented with some Figma extensions, but their free tier did not provide sound integration to our prototype. This problem can be also considered an addition to the future work section, namely, hosting the game on some platform that allows sound integration to our prototype, or even redoing the game using some programming language (Javascript) and add certain *click* event listeners that generate sound when some action is triggered.

5.5 Host game online

Another problem that arose concerned the actual game deployment. Given the fact that our game consists of a significant amount of screens and different scenarios for each of the user's inputs, actually deploying the game onto an online version so that it can be played more conveniently without having to open Figma was a problem initially. Because Figma does not have any feature that directly allows us to host our prototype online, we decided to shift our attention to plugins. We experimented by trying different plugins, such as Pigma, Modify, Zeplin, Makers, etc, but they were unable to handle the weight and complexity of our game, at least in their free tier.

6 Extra Features

6.1 Translation to Italian

The game has been written entirely in English. Because the main language spoken at the school is Italian, we decided to translate the game dialogues from English to Italian. For the translation, I worked on translating the game dialogues and technicalities while for the actual confirmation of their correctness, I used DeepL's Translator [5]. DeepL's translator was also used for checking the correctness of the translated cognitive walkthrough grid.

7 Experts' Feedback

7.1 First Iteration

While our product was still under development, we had the opportunity to receive direct and insightful feedback from an expert in this area of research. Their feedback was particularly helpful in understanding children's requirements and specific needs. Based on their suggestions, we decided on making certain improvements and adjustments to our product. Specifically, we agreed on shortening the questions and the answers' length, as long questions and answers tend to reduce children's engagement. As a result, we managed to refactor and decrease their length by 50%, thereby yielding a cleaner, simpler, user-friendly, and easier-navigable UI. Additionally, the expert suggested removing negative-context scenarios from our questions, as kids usually tend to adopt behaviors they are exposed to. Removing negative-context scenarios from our game promotes positive learning experiences and at the same time prevents uncomfortable situations.

7.2 Second Iteration

We also had the chance to receive extensive feedback from two more experts on this area during the second iteration performed on the 24th of May. During this iteration, we demonstrated to them our game logistics, rules, and flow. Following that, they suggested certain improvements to the game that would make the experience for the kids better. The feedback they provided included suggestions to include images alongside the traits of introvert, extrovert, spontaneous, and organizer. This would help avoid any confusion regarding the roles and teach those who may not be

familiar with the meaning of each term. Other feedback included recommendations to make the product look more attractive to the players by incorporating stylistic changes such as changing the colors of certain buttons, enhancing contrast in different screens, etc.

8 User Assessment

8.1 Early Evaluation

After our product was finalized, we decided to test it. The user assessment took place on the 31st of May. For the evaluation, we conducted a cognitive walkthrough activity. [13]. A cognitive walkthrough is a collaborative session, organized to assess the usability, effectiveness, and efficiency of an application, system, or product. In this session, a group of experts is solely devoted to testing and reviewing a particular product, application, or system. Their primary responsibility revolves around thoroughly evaluating and examining the specified item. Their focus consists of using their knowledge and skills to assess various aspects such as functionality, usability, and performance. As a next step, their main goal is to identify any potential issues or areas of improvement that may exist in that specific product.

For the user assessment, our cognitive walkthrough table, acquired for the user assessment task is depicted below. The Italian version, used for the user assessment is contained here

Action Step	Yes	On your own?	The robot told me	No	If no, why not?
Did you manage to understand what to do?					
Is it clear where you need to click?					
Was it easy to do what you wanted to do?					
Did you see any progress after your actions?					

Figure 28. Cognitive Walkthrough Grid

The testers were handed three cognitive walkthroughs each, one for each phase of the game (original screens and game instructions, actual levels gameplay, end-game quiz). The reason why three copies of the cognitive walkthrough grid were used, was because we wanted every kid to reflect on their actions in every separate game phase.

The results of the user assessment session can be visualized below.

8.2 Assessment Game Flow

The game was fully played and all possible scenarios were tested while performing this evaluation. The session started off by explaining to them what the point of our game is, and how useful would their feedback turns out to be. Then, we explained the scope of our Cognitive Walkthrough Grids, when they shall be filled, and the reason behind their use. While the game was on the start screen, the majority of the testers decided to start with the actual game, rather than reading the game instructions. In particular, they commented that they can test the prototype, and in case they find difficulties in going through it, they can consult back on the game instructions. Upon the presentation of the 4 personality traits, we noticed no difficulty in their terminology, which led them fast to continue the game, after having completed the first questionnaire. While filling their first CW Grid, it was noticeable that there was some visible confusion regarding how is every questionnaire supposed to be filled, despite having been explained that in the beginning. The extrovert personality trait was chosen, and as a result, a cat was assigned as their pet. In this path, they managed to get 2 out of 5 levels correct, and 1 out of 2 in the quiz, which, as a first attempt, was promising enough about what was going to follow. Subsequently, they chose to go with the introvert trait. Nothing changed in this scenario as the number of correct responses to both the game and the quiz too were the same as in the extrovert case. Upon doing the spontaneous trait, their game stepped up a bit, and they managed to answer correctly on 3 out of 5 questions correctly, but also both quiz questions too. Lastly, for the organizer trait, they almost achieved a 100% accuracy ratio, with the fifth question being the question that broke their streak (in the last question, the players are supposed to answer with respect to what they feel themselves, not try to be on others' shoes).

8.3 Assessment Reflection

Over time, the children would increase their participation and involvement in the game and be eager to try different game scenarios and paths, despite being time-constrained. When asked about the game's objective, they claimed that it allowed them to understand how other people feel, while at the same time growing the opportunity for self-improvement. For them, the game also highlights behavior scenarios when dealing with other personalities. The quiz for them was more like a self-reflection test, where they could express what they learned while playing the game.

8.4 Assessment's Data in Numbers

This section contains the Cognitive Walkthrough Analysis based on the feedback perceived during the assessment session. In total, 22 samples were collected and analyzed. The following mini-sections contain the derived feedback and observations.

8.4.1 Task 1

For the first task, 17 people found no trouble understanding how the introductory phase of the game works but also saw some progress too following their actions. The vast majority managed to do it by themselves. The ones that answered negatively regarded the third and fourth questions. The majority of comments included observations such as: No, because sometimes you did what you wanted and the NPC gave it to you wrong No, because he did not let me choose what I wanted No, my dog is not like that No, because I already knew she was an extrovert From Task 1, we can conclude that the majority did not have any problems with navigating, while a minority (which is only 5) had issues with the instructions of the NPC or some biased comments about their pets.

8.4.2 Task 2

For the second task, 16 kids answered positively on all questions, at the same time indicating that they did it by themselves. Out of the 4 questions, 6 people answered positively on almost all questions, but since all the questions were not exactly positive, we cannot say that it was a pass for them. The ones that answered negatively are all connected to the second, third, and fourth questions, stating comments such as: No, I did not understand No, because I did not listen No, because I thought of a different answer – my thinking process was different Based on the findings from task 2, we can conclude that the majority of participants demonstrated a good understanding of the context and questions, and were also able to navigate through them without experiencing any difficulty. There was though a small percentage of students who showed difficulty in comprehending the questions, or even why was a specific answer marked as correct.

8.4.3 Task 3

For the last task, which involved quiz comprehension, there was still some misunderstanding regarding which answer should be chosen, and the reasons why. The positive answer ratio was at the same levels as the previous 2 tasks. However, we cannot claim that it was easy for them, as some of them showed difficulty in understanding the purpose of the quiz, or even why certain answers were chosen. The majority of the kids in the end, indicated that the game did a solid job in helping them understand how other people feel when treated in a certain way, whereas others mentioned that the game did not have any effect at all for them, as they already knew these things, etc.

9 Future Work

9.1 Suggestions & Future Work

As a starting suggestion, it was mentioned that the game should contain bigger fonts on the instructions page, where, as it seemed, they had trouble reading all the text contained inside it. Following, they suggested adding more options to the game, meaning that they considered the game to be monotonous, but also childish. Additionally, they suggested adding more difficult questions, but also an English option which shall alternate between the English and the Italian game versions. They also perceived the utilization of images, the ability to select specific traits, and the inclusion of corresponding pets as something positive. Additional suggestions included adding a timer on each level or integrating more personalities. Furthermore, they underline the popularity of personality quizzes and propose the inclusion of a top ten leaderboard to be shared online, providing suggestions for self-improvement. The game aims to foster understanding and personal development. They express a desire for the ability to modify names, images, and even animal types while maintaining their original personality. Moreover, they strongly suggested not providing

feedback for each question but rather waiting until the end of the game and stating the mistakes done during the gameplay. As a last suggestion, they suggested a change in the game's name, with suggestions including The Quest Game, The Emotion Game, The Emotion Quiz, and The Personality Game.

The improvements suggested by them mentioned here can be implemented in a later stage, outside the scope of this bachelor project.

10   Play The Game

10.1   English and Italian Versions

The game's English version can be found here, whereas the Italian version can be found here. Those links point to the game prototypes. The actual game designs and connection among screens are located here and here.

11   Ethical Aspects

11.1   Parents' Consent

Regarding the ethical aspects of our project, considering the fact that our game was conducted using the feedback received from kids, the educational institution we are collaborating with, made sure that consent was given on behalf of the parents for the kids' involvement in the whole process of building our game, letting them know the project's goal, the activities in which the kids would help us and the benefits they would gain by helping us in the overall process.

11.2   Privacy and Data Protection

Additionally, we made sure to pay extra attention to protecting their privacy and data. Only the necessary information, helpful for the design of our game, has been collected, and the names, surnames, schools, or any other detail of the kids have not been disclosed, closely abiding by the Ethics Guidelines. The feedback provided is compiled anonymously, without associating it with any specific names or persons.

References

[1] Buffalo games. `https://buffalogames.com/`. Accessed on: 03 April 2023.

[2] Draw.io - free flowchart maker and diagrams online. `https://app.diagrams.net/`. Accessed: 28 May 2023.

[3] Papers, please on steam. `https://store.steampowered.com/app/239030/Papers_Please/`. Accessed on: 03 April 2023.

[4] E. Arcoya. Types of stories, 2021. Accessed: 3 May 2023.

[5] DeepL. Deepl translate: The world's most accurate translator. `https://www.deepl.com/`, 2017. Accessed: 15 May 2023.

[6] Gusmanson.nl. Harmony square. `https://harmonysquare.game/en`. Accessed on: 03 April 2023.

[7] R. Hartson and P. S. Pyla. *The UX Book: Process and guidelines for ensuring a quality user experience*. Elsevier, 2012. Accessed: 23 May 2023.

[8] Marino. Level up, 2023. Accessed: 8 May 2023.

[9] R. Prins, L. Avraamidou, and M. Goedhart. Tell me a story: The use of narrative as a learning tool for natural selection. *Educational Media International*, 54(1):20–33, 2017. Accessed: 24 April 2023.

[10] RealtimeBoard, Inc. Miro: A visual platform to connect, collaborate, and create. `https://www.miro.com/`, 2011. Accessed: 9 May 2023.

[11] M. Roller and M. Roller. Observation Grid. `https://researchdesignreview.com/tag/observation-grid/`. Accessed: 25 March 2023.

[12] M. Rouse. Role playing game, 2020. Accessed: 7 May 2023.

[13] K. e. Salazar. How to conduct a cognitive walkthrough workshop. `https://www.nngroup.com/articles/cognitive-walkthrough-workshop/`, 2022. Accessed: 27 May 2023.

[14] Vassilatos, Crawshaw. Navigation ux best practices for saas products. `https://pencilandpaper.io/articles/ux-pattern-analysis-navigation/#:~:text=In%20UX%2C%20'navigation'%20includes,and%20how%20to%20get%20there.`, 2023. Accessed: 23 April 2023.

A Appendix

This section contains the appendix.

A.1 Observation Grids

Given the fact that during the intervention I was given the chance to manage only one group, me and my group managed to perform the role-play 4 times exactly, meaning every child was given the chance to experiment with each of the four roles. For this reason, I was able to collect a greater volume of information and feedback which aided in our user requirements and game development process. Because the group consisted of two boys and two girls, we will use the abbreviations **B1B2G1G2**, corresponding to boy-1, boy-2, girl-1, and girl-2. Those abbreviations are placed in the first column of the table.

For the first role-play, we have a G1B1B2G2 scenario. The observation grid looked like this:

Participants	Personalities	Gender Characteristics	Emotions	Actions	Props
G1	Introvert	Shy & Understanding	Continent	Smile	Crystal Shoe
B1	Extrovert	Outgoing	Confident	Shout	Prince's Crown
B2	Organizer	Consistent	Dominant/Assertive	Shout	Tower Clock
G2	Spontaneous	Clever/Inspired	Calm	Smile	Pumpkin

Table 2. Observation grid

In the first scenario, the two boys of the team were assigned the roles of being *consistent* and *outgoing*. The individual assigned the consistent role displayed dominance, assertion, and confidence traits, also observed in the outgoing person. Both individuals expressed the same emotions too, which included smiling and shouting. On the other hand, the two girls on the team were assigned the caring and the clever roles. Their reactions differed significantly compared to the boys' ones, as they were more continent, and calm. In conclusion, the kids assigned the consistent and outgoing roles were more assertive, would pose more dominant on the rest of the team, and displayed great levels of confidence and reassurance.

For the second-role play, we have a B1G1G2B2 scenario. The observation grid is displayed below:

Participants	Personalities	Gender Characteristics	Emotions	Actions	Props
B1	Introvert	Shy & Understanding	Continent	Smile	Crystal Shoe
G1	Extrovert	Outgoing	Confident	Shout	Prince's Crown
G2	Organizer	Consistent	Partially Dominant	Shout	Tower Clock
B2	Spontaneous	Clever/Inspired	Calm	Smile	Pumpkin

Table 3. Observation grid

Scenario 2 - (B1G1G2B2): The consistent and outgoing girl, would now still act as their assigned label states, but it would be very difficult in many scenarios to step out of their comfort zone and do actions they would usually not do unless explicitly asked to do so (as in this game). Conversely, it was severely difficult for the boys to be assigned the shy and clever roles, as they would also have now to step out of their comfort zone and act accordingly. Therefore it is evident that being assigned a characteristic that is completely different than their actual one, can contain them from expressing themselves in situations where not needed.

For the third-role play, we have a B2G2G1B1 scenario.

Participants	Personalities	Gender Characteristics	Emotions	Actions	Props
B2	Introvert	Shy & Understanding	Continent	Smile	Crystal Shoe
G2	Extrovert	Outgoing	Confident	Shout	Prince's Crown
G1	Organizer	Consistent	Dominant/Assertive	Shout	Tower Clock
B1	Spontaneous	Clever/Inspired	Calm	Smile	Pumpkin

Table 4. Observation grid

This case was very similar to the previous one, as the outgoing and organizer people were previously in opposite roles. Therefore, not many things changed compared to the previous scenario, as the reactions and the role-play were quite identical.

For the last role-play, we had a G2B2B1G1 distribution. The observation grid is shown below.

Participants	Personalities	Gender Characteristics	Emotions	Actions	Props
G2	Introvert	Shy & Understanding	Conflicting	Calm	Crystal Shoe
B2	Extrovert	Outgoing	Conflicting	Refrain from being dominant	Prince's Crown
B1	Organizer	Consistent	Conflicting	Refrain from being assertive	Tower Clock
G1	Spontaneous	Clever/Inspired	Conflicting	Assertive	Pumpkin

Table 5. Observation grid

Having performed 3 different game scenarios already, the children displayed signs of tiredness. As such, during the last role-play, I had trouble containing and convincing them to finish the game. As such, the feedback received from the last scenario was that there was a great volume of conflicts, which also depended on the fact that the role-play was performed 3 times. As such, the boys tried to refrain from being more dominant and assertive towards girls, whereas the girls were calm and assertive for the introvert and spontaneous traits respectively.

A.2 Game Flow

In this appendix section, we show pictures of the rest of the traits' gameplay. Starting off with the extrovert one, we have:
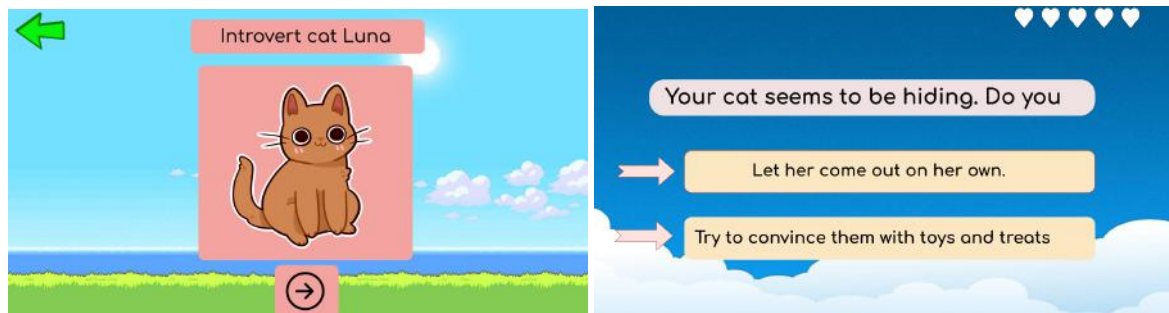
(a) Extrovert Game Start

(b) Extrovert Question I
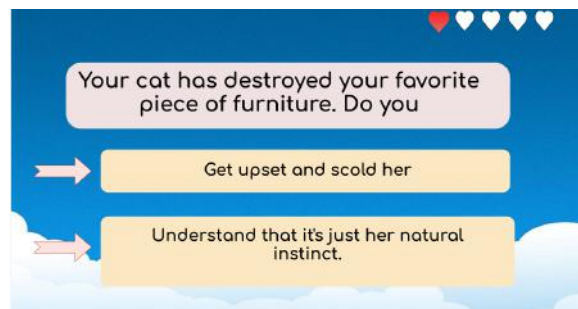
(c) Extrovert Question II

Figure 29. Extrovert Questions I
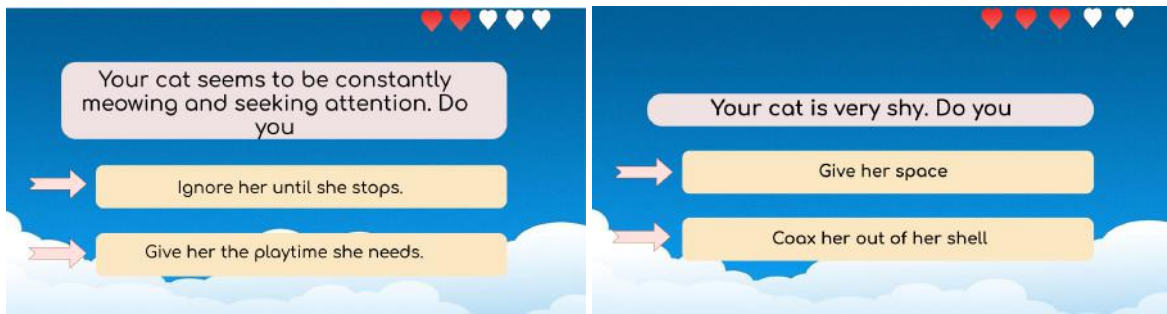
(a) Extrovert Question III

(b) Extrovert Question IV
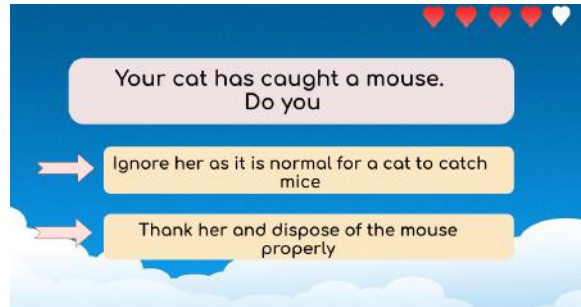
(c) Extrovert Question V

Figure 30. Extrovert Questions II

In case of mistakes, the respective screens appear:
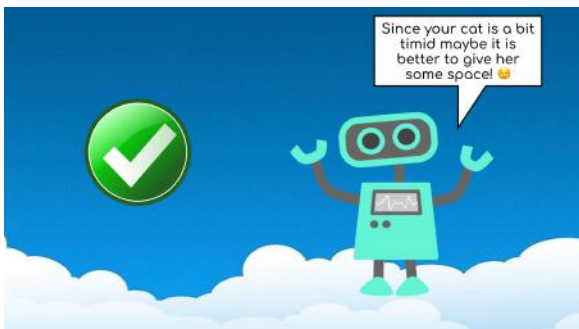
(a) Extrovert Mistake I
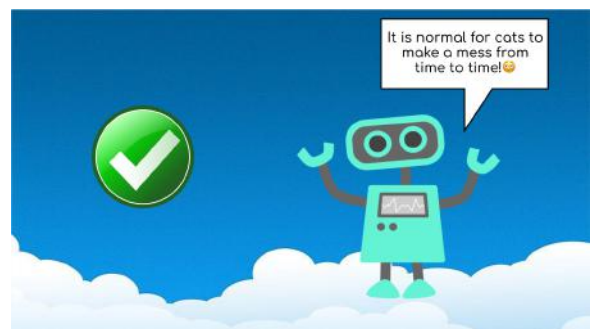
(b) Extrovert Mistake II
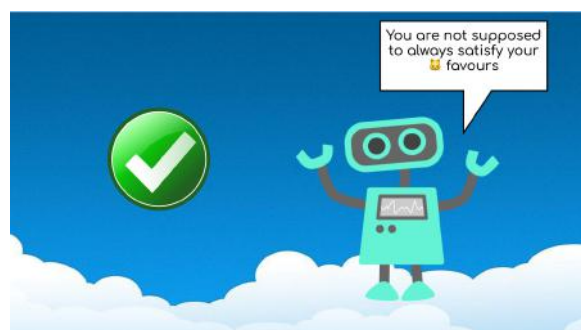
(c) Extrovert Mistake III

Figure 31. Extrovert Mistakes I
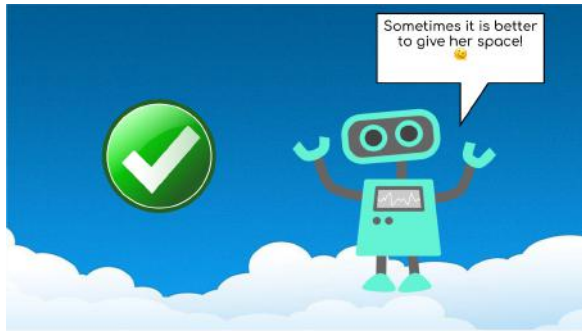
(a) Extrovert Mistake IV
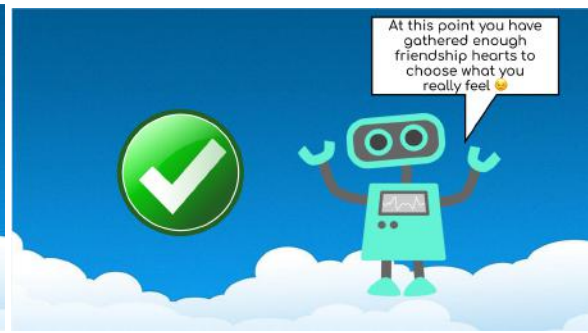
(b) Extrovert Mistake V

Figure 32. Extrovert Mistakes II

The respective quiz's questions look like this:

(a) Question I

(b) Question II

Figure 33. Extrovert Quiz

For the spontaneous one:

(a) Spontaneous Game Start

(b) Spontaneous Question I

(c) Spontaneous Question II

Figure 34. Spontaneous Questions I
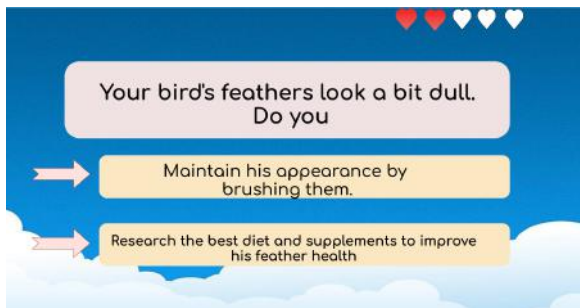
(a) Spontaneous Question III
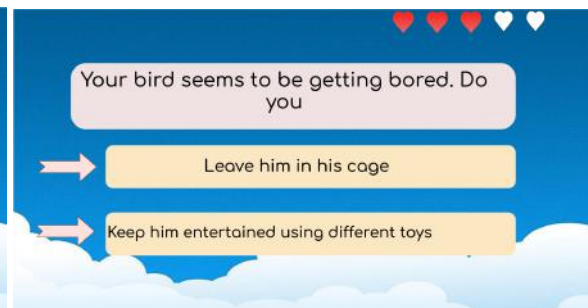
(b) Spontaneous Question IV

(c) Spontaneous Question V

Figure 35. Spontaneous Questions II

In case of mistakes, the respective screens appear:
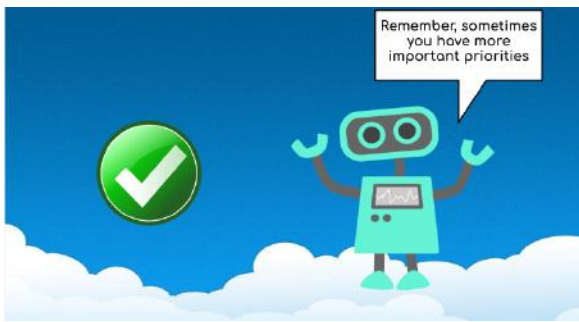
(a) Spontaneous Mistake I

(b) Spontaneous Mistake II
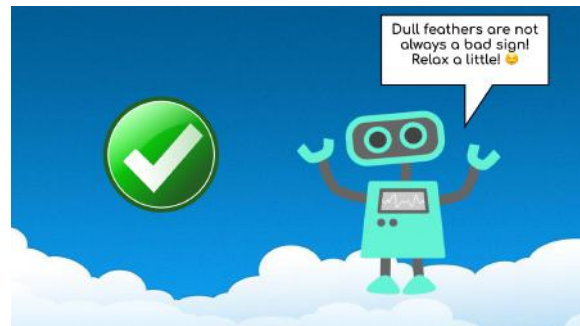
(c) Spontaneous Mistake III

Figure 36. Spontaneous Mistakes I
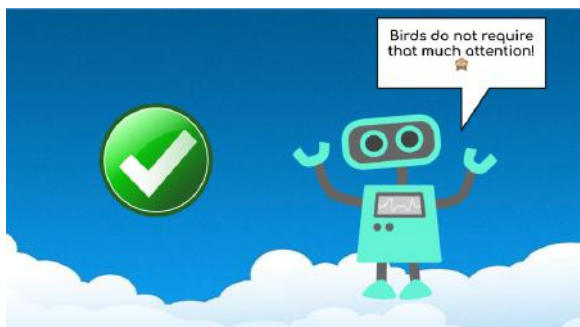
(a) Spontaneous Mistake IV
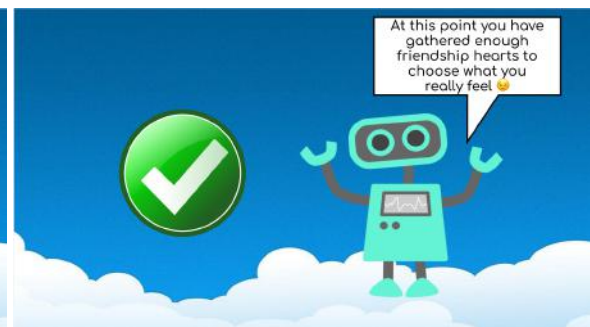
(b) Spontaneous Mistake V

Figure 37. Spontaneous Mistakes II

The respective quiz's questions look like this:

(a) Question I

(b) Question II

Figure 38. Spontaneous Quiz

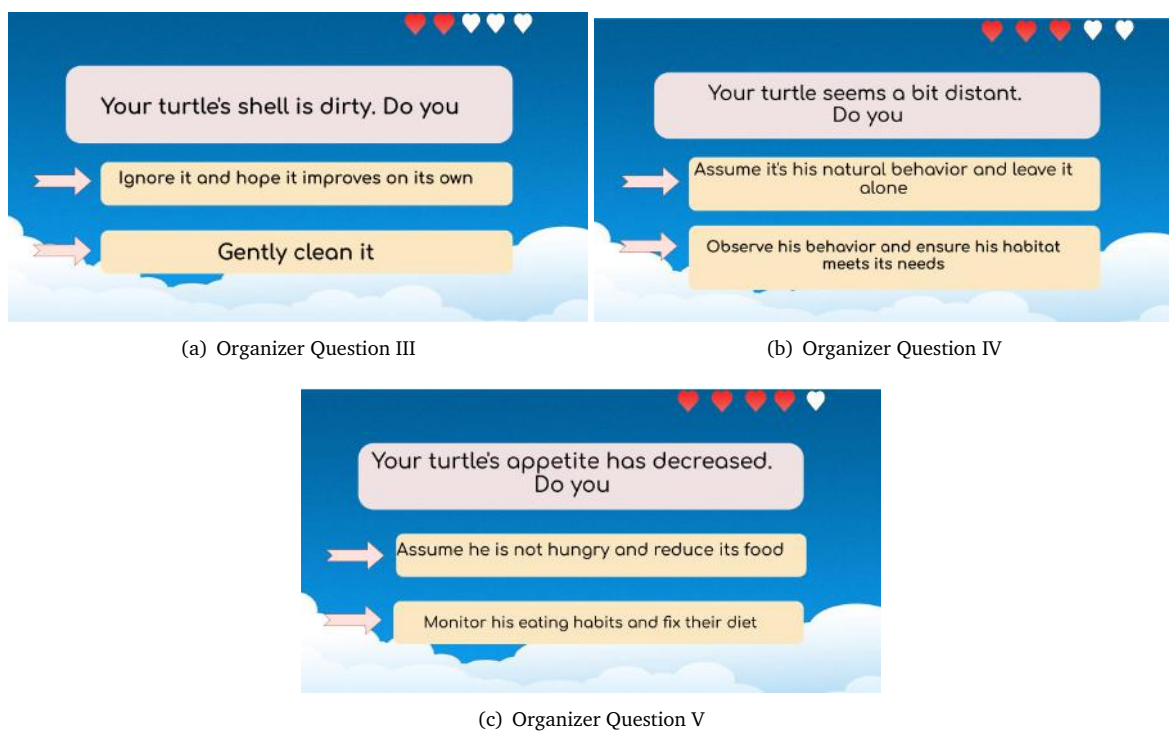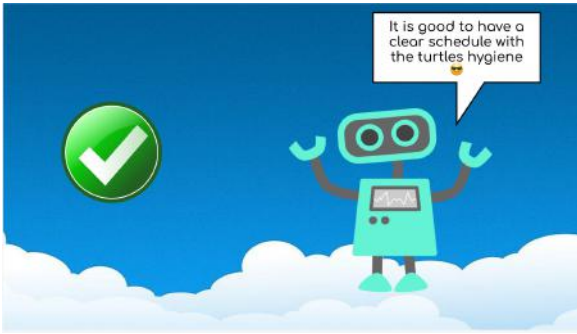Lastly, for the organizer one, we have:

(a) Organizer Game Start

(b) Organizer Question I

(c) Organizer Question II
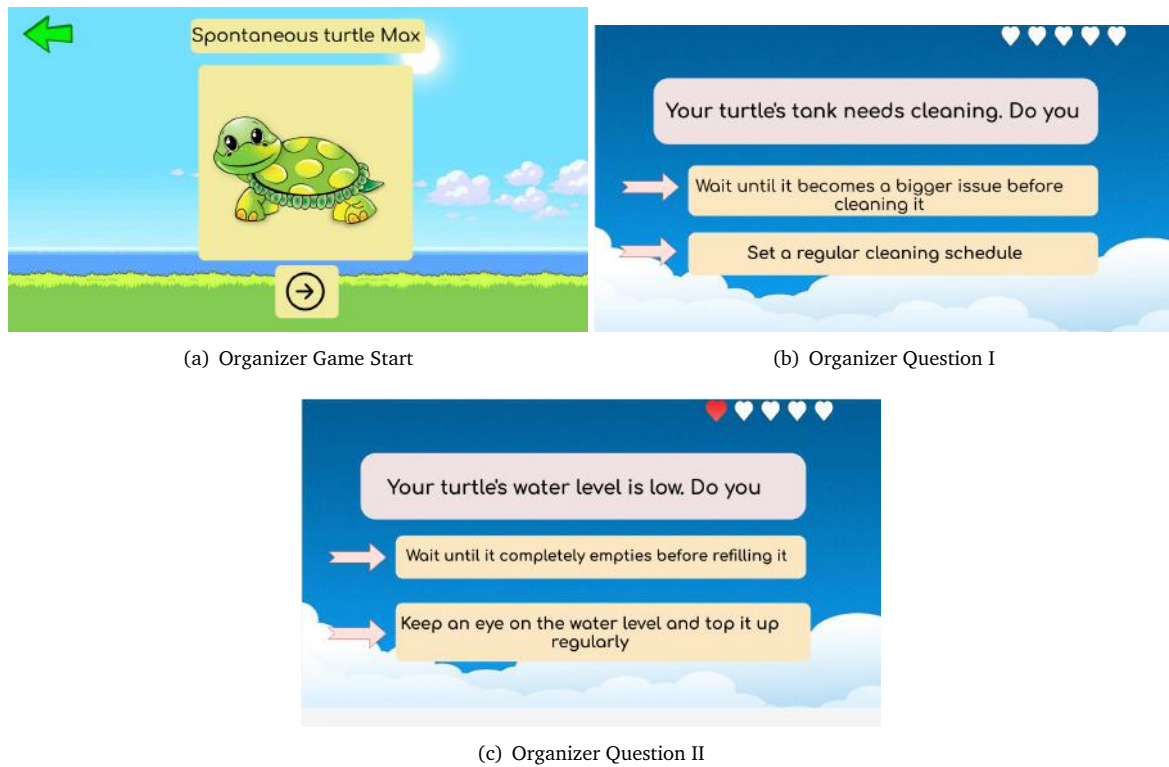
Figure 39. Organizer Questions I

(a) Organizer Question III

(b) Organizer Question IV

(c) Organizer Question V

Figure 40. Organizer Questions II

In case of mistakes, the respective screens appear:
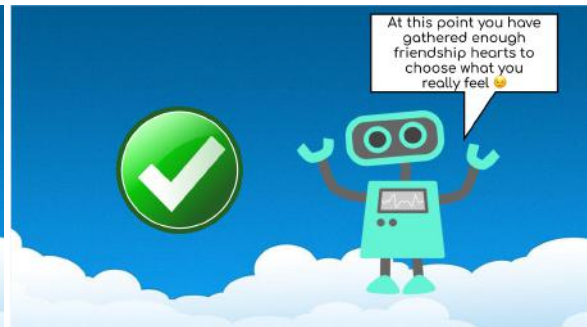
(a) Organizer Mistake I

(b) Organizer Mistake II

(c) Organizer Mistake III

Figure 41. Organizer Mistakes I

(a) Organizer Mistake IV

(b) Organizer Mistake V

Figure 42. Organizer Mistakes II

The respective quiz's questions look like this:

(a) Question I

(b) Question II

Figure 43. Organizer Quiz

A.3 Italian Cognitive Walkthrough Grid

Below you can see the Italian version of the cognitive walkthrough grid, used during the user assessment.

Domanda	Sì	Da solo	Il robot mi ha aiutato	No	Se no, perché?
Si capisce cosa devi fare?	☐	☐	☐	☐	
È chiaro dove devi cliccare?	☐	☐	☐	☐	
È facile fare quello che volevi?	☐	☐	☐	☐	
Vedi qualche progresso dopo le tue azioni?	☐	☐	☐	☐	

Domanda	Sì	Da solo	Il robot mi ha aiutato	No	Se no, perché?
Si capisce cosa devi fare?	☐	☐	☐	☐	
È chiaro dove devi cliccare?	☐	☐	☐	☐	
È facile fare quello che volevi?	☐	☐	☐	☐	
Vedi qualche progresso dopo le tue azioni?	☐	☐	☐	☐	

Domanda	Sì	Da solo	Il robot mi ha aiutato	No	Se no, perché?
Si capisce cosa devi fare?	☐	☐	☐	☐	
È chiaro dove devi cliccare?	☐	☐	☐	☐	
È facile fare quello che volevi?	☐	☐	☐	☐	
Vedi qualche progresso dopo le tue azioni?	☐	☐	☐	☐	

Figure 44. Cognitive Walkthrough Grid Italian Version