

Video Games for Empathy and Understanding Towards Human Migration

by

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ABSTRACT

Video games have recently started playing a more important role in education, though there is limited research on how they can be used to generate *empathy* and *understanding* towards their subject matters. To address this limitation, we present *Vida Migrante*, an online interactive simulation game about the struggles of Venezuelan migrants living in Ecuador, and analyze whether or not the game can foster empathy and understanding towards the migrant experience. This study uniquely looks at how the game can communicate the findings from real migrant data in such a way that users can empathize with them. A set of 52 students at the Massachusetts Institute of Technology were surveyed and asked a series of Likert-style and open-ended questions to determine whether or not this game generated empathy and understanding towards the topic. An in-depth quantitative and qualitative analysis reveals that although respondents already had high levels of empathy and understanding, the game was able to increase those levels rather significantly. This work shows that video games like these can be used not only to increase familiarity and understanding of a humanitarian issue, but also empathy towards the data and the presented human experiences. This paper lastly contributes a discussion of the specific features of this game that allows empathy generation to occur, which may help motivate future work to create effective games that allow its players to empathize with important issues in today's technology driven world.

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Contents

- Title page 1
- Abstract 2
- Acknowledgments 3
- List of Figures 6
- List of Tables 8
- 1 Introduction 9**
 - 1.1 Background 10
 - 1.1.1 The Importance of Empathy in Technology 10
 - 1.1.2 What are Video Games? 11
 - 1.1.3 What is Empathy? 12
 - 1.1.4 Migrant Integration Background and *Vida Migrante* 13
 - 1.2 Related Works 17
 - 1.2.1 Empathy Games 17
 - 1.2.2 Testing for and Quantifying Empathy Creation 18
- 2 Methodology 20**
 - 2.1 User Study Design 20
 - 2.1.1 Demographic and Prior Knowledge Questions 20
 - 2.1.2 Cognition Questions 21
 - 2.1.3 Game Playthrough 23
 - 2.1.4 Post-playthrough Questions 23
 - 2.2 Logistical Details 24
 - 2.3 Respondents 24
- 3 Results 25**
 - 3.1 Caveats and Potential Biases 25
 - 3.2 Respondent Demographics 26
 - 3.3 Changes in Empathy 28
 - 3.3.1 Familiarity with In-Game “Characters” 32
 - 3.3.2 Stepping into the Shoes of the Migrants 33
 - 3.3.3 Shared Feelings of Distress and Hopelessness 34

| | | |
|----------|---|-----------|
| 3.3.4 | Specific Mentions of Empathy Generation | 37 |
| 3.4 | Changes in Understanding | 39 |
| 3.4.1 | Difficulty of the Migrant Experience | 40 |
| 3.4.2 | Illusion of Choice | 41 |
| 3.4.3 | Tradeoffs in Decision-making | 42 |
| 3.4.4 | Importance of Time and Resources | 43 |
| 4 | Discussion and Conclusion | 45 |
| 4.1 | Comparison to Other Studied Empathy Games | 45 |
| 4.2 | Features of Video Games for Empathy Generation | 46 |
| 4.2.1 | What Worked Well | 46 |
| 4.2.2 | What Didn't Work Well | 47 |
| 4.3 | Future Work | 48 |
| 4.3.1 | Improvements to Current Research | 48 |
| 4.3.2 | Additional Topics Within the Study of Empathy Games | 49 |
| 4.4 | Conclusion | 50 |
| A | <i>Vida Migrante</i> Screenshots | 51 |
| B | Code Listing | 53 |
| | References | 55 |

List of Figures

| | | |
|-----|--|----|
| 1.1 | Players of <i>Vida Migrante</i> get to choose the migrant they want to experience the simulation as and their occupation. | 14 |
| 1.2 | Players of <i>Vida Migrante</i> receive cards, such as the “Remittances” card, where they must decide what to do. | 15 |
| 1.3 | Players can select an assistance twice a game which helps them in their journey to integrate into Ecuador (left). At most points in the game players can also see their current resources in a dashboard view, such as their income, expenses, and hours worked, as well as a breakdown of their expenses (right). | 16 |
| 1.4 | Examples of popular and highly praised empathy games. | 17 |
| 2.1 | Graph mapping Cognition Questions to their targeted research question, empathy and/or understanding. Positive cognition questions are highlighted in green, while negative cognition questions are in red. | 22 |
| 3.1 | Distribution of familiarity with the topic of migration (left) as well as video games (right). The distribution of migration familiarity is fairly normal while the distribution of video game familiarity is skewed more to the left (mean familiarity of 5.3). | 26 |
| 3.2 | Breakdown of self-identified race and ethnicity of respondents. Note that 4 respondents ($\approx 8\%$) declined to self-identify. | 27 |
| 3.3 | Summary of respondents’ empathy scores before and after playing the online simulation game <i>Vida Migrante</i> . Scores are broken down into 1) the final combined scores of empathy and understanding (purple), 2) the scores given <i>just</i> empathy questions (red), and 3) the scores given <i>just</i> understanding questions (blue). | 28 |
| 3.4 | Average raw empathy scores before and after playing the online simulation game <i>Vida Migrante</i> , broken down by cognition question. Questions with an asterisk (*) are <i>negative</i> and have been normalized, as explained in Section 2.1.2. | 29 |
| 3.5 | Box plots showing the distribution of the percent change in empathy/understanding. Similar to Figures 3.3 and 3.4, the color represents whether or not values are broken down by empathy, understanding, or both empathy and understanding. | 30 |

| | | |
|------|--|----|
| 3.6 | Scatterplot showing the percent change in empathy as a function of the starting normalized empathy score, before playing the game. The linear regression line loosely suggests that there is a negative correlation. | 31 |
| 3.7 | Distribution of levels of engagement with the game. | 35 |
| 3.8 | Distribution of how <i>difficult</i> making decisions was within the game. | 36 |
| 3.9 | Distribution of responses towards how the affordances the game provided towards interacting with the data, inspired by William Allen’s data visualization typology. The mean response for each of the four categories is shown as a gray dashed line. | 38 |
| 3.10 | Pie chart showing how most respondents indicated that they learned something new about the migrant experience after playing <i>Vida Migrante</i> | 39 |
| 3.11 | The “Community Support” card where players have to decide whether to take time off to help the community or not. Respondents’ reactions to this card show how they empathize and understand the tradeoffs migrants must make, in this case between helping others and helping themselves. | 43 |
| 4.1 | Summary of starting and ending empathy <i>and</i> understanding across all respondents, broken down by self-identified gender. * <i>Omits 2 responses, one is non-binary/non-conforming, the other did not self-identify.</i> | 49 |
| A.1 | <i>Vida Migrante</i> landing page. The website can be found at https://vidamigrante.migration.mit.edu | 51 |
| A.2 | Decision option modal. Every decision comes with additional details and context based on the real migrant data. This helps with fostering understanding towards the topic of migration. | 52 |
| A.3 | Landing page details. The landing page contains background information and context that is helpful for increasing user understanding of the topic. For example, numerous respondents were shocked to learn that "Over half of the migrants spent more than 90 percent of their monthly income on basic necessities." | 52 |

List of Tables

- 2.1 Cognition Questions (Empathy and Understanding) 21
- 2.2 Open-Ended Questions 23

Chapter 1

Introduction

In the past decades, the popularity of video games not only as an entertainment medium but also as a tool for *education* has grown immensely [5]. The introduction of video games into popular culture has sparked a new way of thinking about entertainment and education as it provides a completely new medium for these goals. Video games and the concept of “gamification” have been known used teach and increase awareness in a broad range of topics, including quite serious topics such as racism and humanitarian crises [32]. However, *empathy* is an often overlooked focus when it comes to using video games as an educational tool. This paper seeks to broaden the studied work of video games as a form of education so that it includes—and primarily focuses on—making the game’s audience more empathetic to the topic it is exploring. We explore in this paper the role of video games when it comes to creating empathy **by analyzing an existing game on migrant integration and by conducting a user study on it’s effectiveness**. We introduce this game, *Vida Migrante*, in Section 1.1.4. In light of this, there are two primary questions this study is trying to answer.

1. Is **empathy** generated by playing a video game about humanitarian topics, and how much is generated?
2. Do people gain more **understanding** of the topic, and how much more understanding?

The first question aligns itself to our overall research goal, which is to determine if people are able to gain *empathy* from interacting with a video game. However, empathy is not complete without a general understanding of the topic; our second goal of seeing how much *understanding* people gain allows us to see if games can also be used for general understanding, regardless of a player’s empathy level. A secondary goal of these types of games is simply to educate people on a variety of topics. Some topics, particularly humanitarian topics like migration, may be less known by the public, so it is important to find a way to encourage people to understand and empathize with them. Note that a video game that seeks to achieve these goals can be defined as an “empathy game,” a term that is used throughout this paper (see Section 1.1.2 for an introduction to this term and Section 1.2.1 for examples of empathy games).

This study also seeks to answer some supplementary questions on this particular game, which may extend to other empathy games. Such questions include the following:

- What specific features of the game allow people to become engaged with the content and premise?
- How do people with varying demographics and backgrounds approach the game differently?
- How do people approach decision making when playing through a game that simulates difficult life experiences?
- What kind of insights do people make when faced with an empathy game?

Again, while this study specifically focuses on one particular game, we hope that its findings can help guide the creation and development of other empathy games, ultimately bringing previously unheard of yet important humanitarian topics to light.

1.1 Background

The primary focus of this study is an **online simulation game** called *Vida Migrante* created to teach people about the experiences of Venezuelan migrants living in Ecuador as well as get people to empathize with the subject (more details about this game are covered in Section 1.1.4). Thus, in order to properly contextualize this work, some background must be covered, including the importance of empathy in technology, definitions of both empathy and video games, and a description of the game itself.

1.1.1 The Importance of Empathy in Technology

Studies show that empathy is often lacking in the realm of technology, especially in software products such as video games [4][30]. However, because of the incredible growth technology and software has experienced in recent decades, the importance of empathy cannot be overstated. For example, “empathy-creating” material has been shown to be quite important for successfully teaching computer science students about accessibility in the software products they may create [15]. Additionally, as video games have also become extremely popular, their role as an empathy-creating medium is also being studied. Video games often receive criticism for being “anti-empathy” mediums—violent video games are often cited—yet now more than ever games are being used to shed light on real-world issues, as we discuss in Section 1.2.1 [26]. Therefore it is important to look at not only how video games can be used to develop empathy towards any topic, but also how *effective* they can be in developing that empathy.

Another challenge that arises when it comes to empathy generation is the fact that empathy takes time and consistent effort to generate, which is orthogonal to the goal of modern technology of accelerating information gain. Empathy creation techniques must evolve to match this rapid evolution in the way we learn about new things [36]. For example, computer scientists (taking from the technology perspective) and psychologists (taking from the perspective of the human brain) alike have cited a decrease in human attention spans and focus over the last few decades [27]. Those not already empathetic towards certain

topics might difficulty finding a medium that allows them to empathize in the amount of time and attention they are ready to give. Fortunately, the space of video games, with their connotation of being “fun,” “engaging,” and “interactive,” may be an excellent way to bring empathy creation into a face-paced digital world. In our discussion in Section 4, we find that, taking from the results of this study, there are in fact several key features of video games that can generate empathy extremely effectively.

1.1.2 What are Video Games?

Part of any study exploring video games is establishing what a video game actually is. Additionally, because of the open-ended nature of empathy, it is important that we define video games first so that our definition of empathy is properly suited for this context. As video games have successfully rooted themselves in popular culture, there is an incredible variety of types of games, so establishing a consistent definition is important. Arthur Berger in *Video Games: A Popular Culture Phenomenon* cites several specific characteristics of video games, such as being entertainment, having rules, taking place in some environment whether real or abstract, and, most relevant for this particular study, being perceived as “artificial” and not real life [5]. From another point of view, James Gee in *Are Video Games Good for Learning?* creates a definition by broadly categorizing them into problem-solving games, where players need to solve a problem or tackle some issue, and “world” games where players interact with a simulated world [14]. Given these and other perspectives on video games, there are 3 common threads in video games that appear to emerge:

1. Video Games have the concept of a **player**, user, or agent. All games have a single human as the main player, though many games also contain other agents that are either other people or non-humans, known as NPCs (Non-Player Characters) or AIs (Artificial Intelligences).
2. Players are placed within a **digital virtual environment**. Environments are often based on a real physical space, which can include 3-dimensional spaces based on real life such as in *Elden Ring* or *The Sims*, or simplified 2 dimensional environments such as *Super Mario* or *Hollow Knight*. Environments can also be more abstract, such as a game board like in *Tetris* or simply the notion of a location, like *Vida Migrante*, the focus of this paper.
3. Players **interact** with the environment they are in. Perhaps the core feature of video games, players are given the affordance of *interacting* with the environment in various ways, which, as Berger describes, allows players to really immerse themselves in the game [5]. Similar to the environment, interactions can be based on real-life interactions such as walking, jumping, etc., or are more abstract in problem games like in the case of *Vida Migrante*, where the interactions involve players making *decisions* and solving problems throughout the game [14].

What ultimately makes video games different from traditional media is the high amounts of *player-environment interaction*, which allows players to really immerse themselves into the situations they are put into. Not only does this quality of immersion make video games

fun and engaging, it can also be used as an empathy generation tool as explained in Section 1.1.3.

Lastly, as games have evolved and people have recognized the power video games have in contexts outside of entertainment, several subcategories or genres of games have been created that can help frame this research. Stemming from Gee’s problem-solving game category comes **epistemic or educational games**, which he states allow players to build understandings and create identities of their own by “inhabiting virtual worlds,” making it easier to learn [34]. Even though the educational genre of video games has been widely studied, a more pointed subcategory of games does exist and has been growing in popularity, the **empathy game**. Empathy games specifically target empathy generation towards a specific topic by using the same properties of games used for education, which is the focus of this research. The immersion of games is perfect for letting players “step into the shoes” of other people in other situations, a core component of empathy generation. Some empathy games are already well known within a subset of the video gaming community, which we go through in Section 1.2.1. Given this class of empathy games, we hope that by explicitly studying the effectiveness of our own empathy game *Vida Migrante*, others may be inspired to create similar games so that people around the world can empathize with important issues and ultimately help provide a means to alleviate such issues.

1.1.3 What is Empathy?

The study of empathy in the modern world (outside of the context of video games) goes back to the mid-20th century, with various authors creating several formal definitions within the field of psychology. Rosalind Dymond defined empathy in her 1949 paper *A Scale for the Measurement of Empathic Ability* as the “imaginative transposing of oneself into the thinking, feeling and acting of another,” which today has colloquially become known as “putting oneself in someone else’s shoes” [12]. Later authors such as Ezra Stotland in *Exploratory Investigations of Empathy* critiqued this definition because of how it focused too much on how “accurately” the empathetic person could predict the other person’s thoughts and actions [35]. Stotland proposed that while yes, empathy is the ability of a person to imaginatively place themselves into the lives of others, it can primarily be defined as the “vicarious” emotional response the person feels due to the other person’s emotions. This looser definition gives us more freedom to explore how users reacting to a video game might gain empathy. Within our definition of video games in Section 1.1.2, often times there is no “other” person that people can react to, since the player themselves acts *as that person* and is making the decisions themselves. In *Vida Migrante*, the “other” person is an abstract representation of a migrant that the person plays as. As we will see in the results of the study (Section 3.3), many respondents may see the migrant *as themselves*, while others see them as a different person, depending on how much empathy they have.

In order to deepen the analysis on empathy generation from video games, we can also explore the different facets of empathy. Leiberg and Anders’ paper *The Multiple Facets of Empathy: A Survey of Theory and Evidence* guides our analysis with their study on how empathy is created [24]. Their findings can be grouped into three categories:

1. Empathy can be created through the **reproduction** of others’ mental states. This is

often described as Simulation Theory, where we automatically “simulate” other people’s mental states in our own minds [16]. For example, if we see someone showing signs of pain, empathy is created by simulating that pain in our minds.

2. Empathy can be created through prior representations and **familiarity** of situations. This method is often described as a “contagion,” where the feelings of other people can activate specific experiences in our own minds, thus creating empathy. Using the same pain example, empathy can be created when seeing someone in pain by *remembering* a time when we were in pain.
3. Empathy can be created using **perspective-taking**, the act of taking information from several sources to determine the other person’s mental state. Perspective-taking comes in a “self-focused form” (drawn from Stotland’s definitions of empathy), where a person can *imagine* how they would feel in the other person’s situation. Unlike the first two methods, perspective taking allows us to generate empathy without necessarily *seeing* the emotions of the other person, rather we *imagine* what they might be like. Taking an example from Leiberg and Anders, we may see our friend failing a test, and even if they do not *show* emotion, we may use the context from multiple perspectives (for example, they have been studying a lot, and that they want to get a good grade in the class) to determine that they are sad or upset.

This breakdown of empathy generation can help us understand how video games can help contribute to empathy generation. Because video games can provide a virtual environment, the situations can appear real enough where users may be able to properly simulate those emotions, despite not actually interacting with a real human being, thus contributing to the first facet of empathy generation. Similarly video games can provide education on the situations that people go through, thus creating a better sense of familiarity towards the situations and increasing empathy. This is another reason why *understanding* is the second focus of this study, because of the ability for video games to *teach* people about the situations others go through. The high level of interactivity in video games also allows the player’s virtual experience to be tailored to their own experiences. For example, a game that allows people to choose their character (such as in *Vida Migrante*), if designed properly, allows them to connect with them and their experiences even before they start the game. Lastly, for the third facet, video games can greatly contribute to perspective-taking because of the rich amount of context they can provide in their virtual environments. Games can display information in several modalities, whether it be through narration, visualizations, interactive dashboards and menus often found in simulation games like *Vida Migrante*, and even in how the environment is presented. All of this information allows players to understand the situations that they are placed in, greatly increasing the chances of empathy being created, even if they are unfamiliar with the actual emotions being displayed.

1.1.4 Migrant Integration Background and *Vida Migrante*

Given this project’s focus on human migration, this section briefly describes the background of migrant integration in Ecuador and the game that was created. Over the last three decades around 7 million Venezuelans have left their home country with 500,000 immigrating

to Ecuador [37]. Many migrants left Venezuela due to the political and economic unrest, and have come to Ecuador in search of better job opportunities, food security, and access to healthcare and education. However, migrants trying to integrate into the Ecuadorian society and economy often encounter many challenges, which the World Food Programme (WFP) wanted to explore. As such, in 2022, 920 Venezuelans living in Ecuador were surveyed to gain information about their current condition and uncover the specific vulnerabilities they were facing [38]. The result of this research was a web-based game released in June 2023 that allowed users to step into the shoes of migrants, experiencing their day-to-day decisions and coping strategies in order to thrive in their new home.

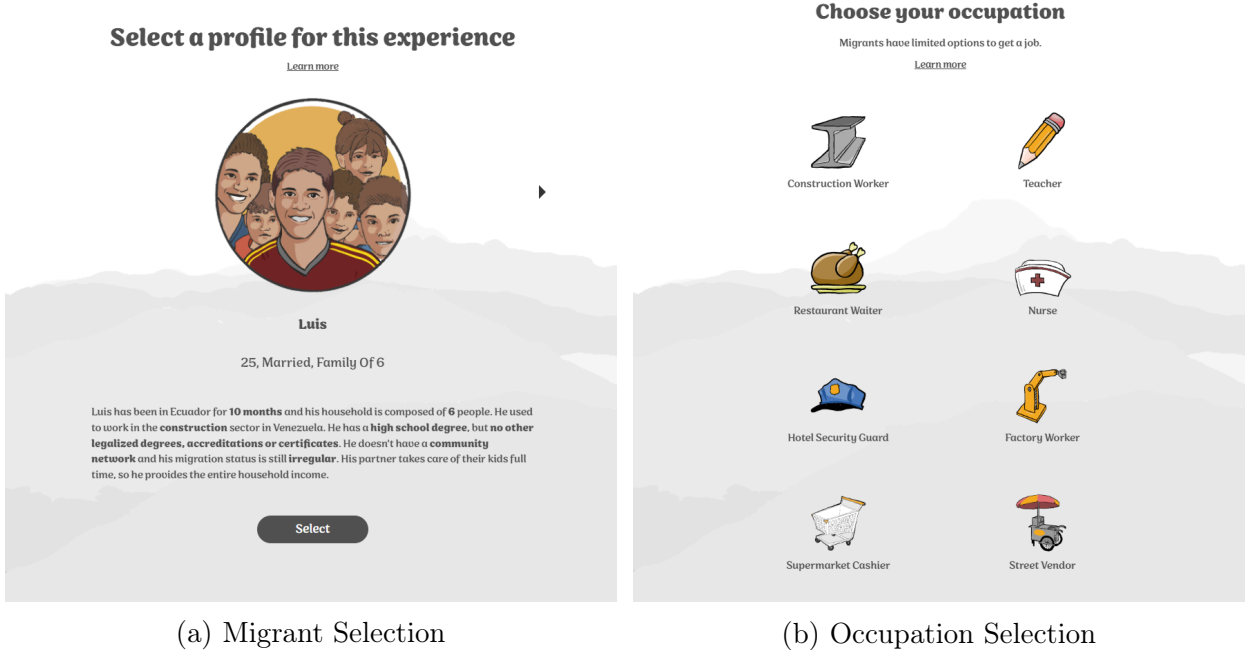


Figure 1.1: Players of *Vida Migrante* get to choose the migrant they want to experience the simulation as and their occupation.

Vida Migrante: Venezuelan Migrants’ Inclusion in Ecuador itself is structured as a single-player, round-based simulation game where users step into the shoes of a migrant and make decisions for them (see Appendix A for additional screenshots). As a brief overview, users first select their **migrant profile** and **occupation** (Figure 1.1), then proceed through a series of 4 months (rounds) where each month they need to make a **decision** based on a **card** they get at random. For example, users may get the “Remittances” card, where they need to decide if they are going to borrow money to send it back to a relative in Venezuela or forgo sending money altogether (Figure 1.2). Lastly, users can select **assistances** provided by nongovernmental organizations (NGOs) which may help their living situation, which is meant to emulate potential policy interventions (Figure 1.3a).

It is also important to understand the development of *Vida Migrante* in order to see the goals we hoped to achieve regarding the creation of empathy and understanding. First, *Vida Migrante* was originally planned as a standard data visualization project to highlight

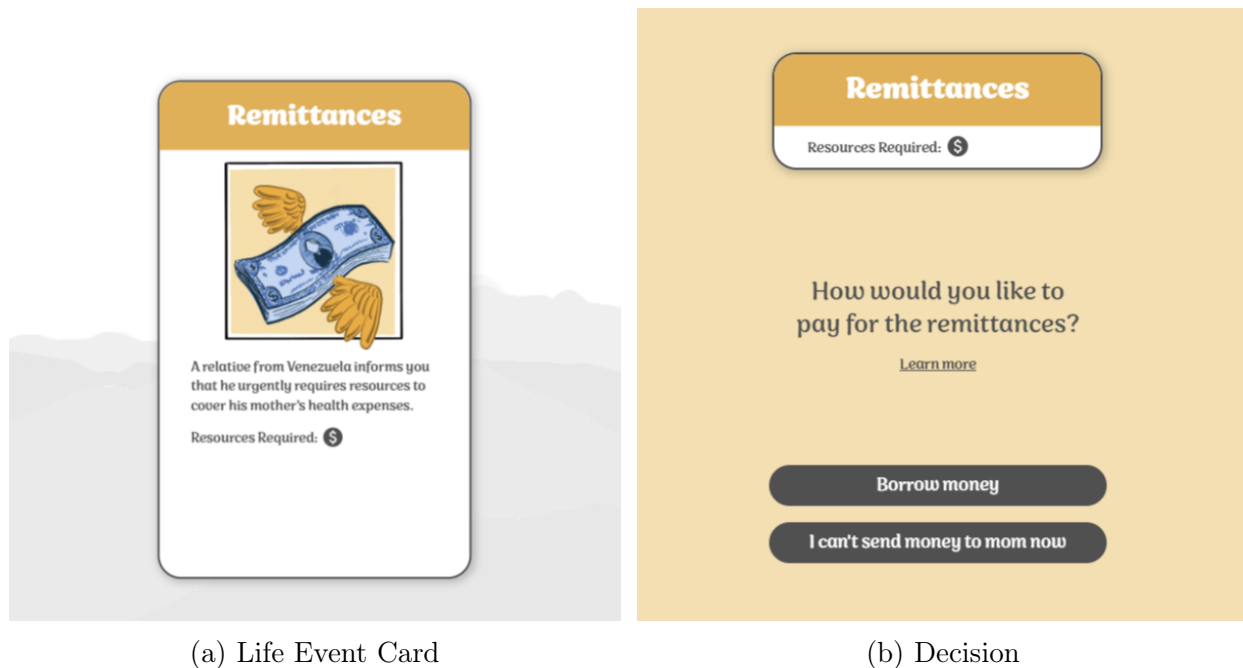
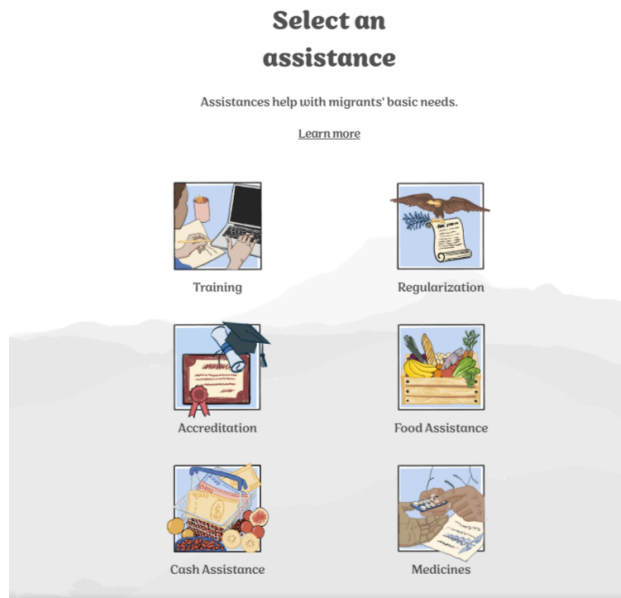
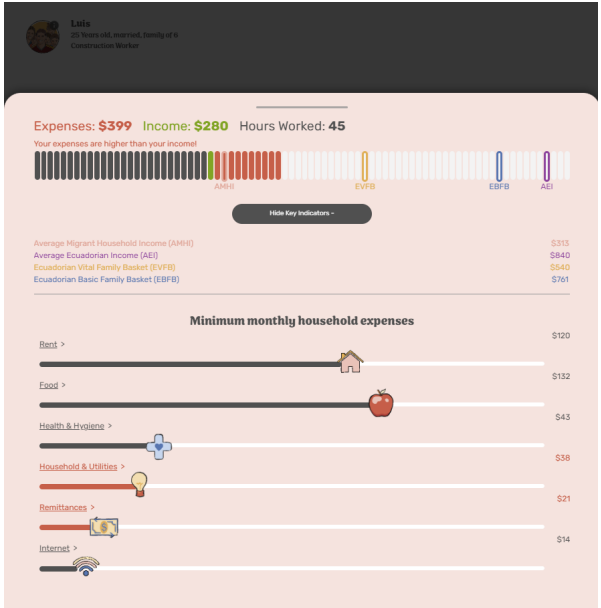


Figure 1.2: Players of *Vida Migrante* receive cards, such as the “Remittances” card, where they must decide what to do.

several findings from the survey of 920 Venezuelans. We primarily found that there is a disparity between vocational skills the Venezuelan migrants already had and attainable careers in Ecuador, as well as insufficient resources for migrants to improve their employment opportunities. These factors have led to high food insecurity amongst migrants, to the point that migrants have been reported putting 90% of their income towards necessities like food, rent, and health, preventing them from being able to pursue personal growth opportunities such as training to improve their economic situation [10]. Because of these startling observations, we sought to create some medium that communicated these findings and allowed people to empathize with the migrant situation. However, during the design process, it became clear that a standalone visualization or static website would *not* be compelling enough for users to truly grasp the situation. Therefore, the idea of creating an online simulation game was put into place. Importantly, *Vida Migrante* is at its core *still* a data visualization project, because there is real data being used in the background, only this data visualization is fully user-driven. For example, all decisions and cards are based off of real migrant experiences and data; every decision has a corresponding “implication text” that cites real data, giving context to the player’s decision. When borrowing money, for instance, a popup appears stating how “48% of migrants have to ask for money from family or friends to meet their basic needs” (Figure A.2) [11]. Similarly, the migrant profiles—Luis, Génesis, María, and Jose—are not completely imaginary profiles, rather they are taken directly from the data. The profiles were found by by running a K-means clustering algorithm, a form of unsupervised machine learning, on the migrant biographies sourced from the WFP survey data, then by taking the average values of a series of characteristics (such as family size and immigration status) of 4 clusters [38]. The “average” migrant from each of these 4 clusters



(a) Assistances Selection Page



(b) Dashboard

Figure 1.3: Players can select an assistance twice a game which helps them in their journey to integrate into Ecuador (left). At most points in the game players can also see their current resources in a dashboard view, such as their income, expenses, and hours worked, as well as a breakdown of their expenses (right).

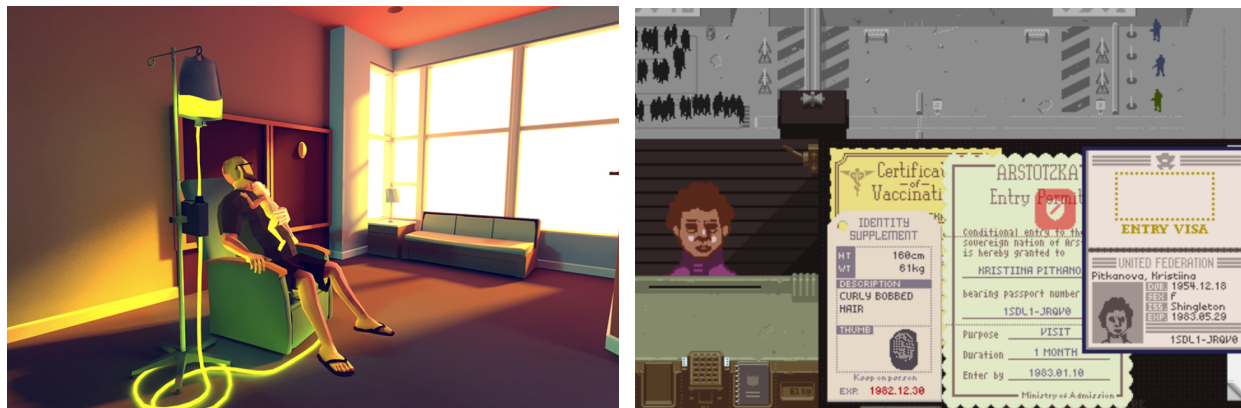
was transformed into the profiles we see in the final website so that players could empathize with them.

Lastly, here we mention a couple of design decisions we chose in hopes of maximizing empathy generation, which we then critique in the discussion section (Section 4.2). First, the migrant selection page was created to allow users to find a profile that they connected to the most, allowing them to establish empathy towards them. Second, the decisions themselves were chosen in a way that not only present the reality of the situation (as they are based on real data), but also show the difficulty in the decision-making and situations the migrants go through. Third, we added assistances to show players how organizations could help migrants as well as strengthen the concept of *tradeoffs* migrants have to make. Lastly, we added a *dashboard* (Figure 1.3b) that keeps track of users' income, expenses, and hours worked to keep them grounded in the reality of their situation. We also added sliders to this dashboard the players could interact with to see how different budgeting could change their expenses. Note that these different aspects of the game—the migrant selection, occupation selection, cards, decisions, assistances, and dashboard—are all referenced throughout the results and evaluated in the discussion at the end of the study.

Again, the goal of this game is to be as interactive and engaging as possible, yet also strike a balance with its more serious educational aspect about the very real issues migrants in Ecuador are going through today. Additionally, this rather new method of using a video game to convey data is something we believe can be studied more in depth, which is another aspect of what this research hopes to inspire.

1.2 Related Works

1.2.1 Empathy Games



(a) *That Dragon, Cancer* (Ryan Green, 2016)

(b) *Papers Please* (Lucas Pope, 2013)

Figure 1.4: Examples of popular and highly praised empathy games.

Past works have conducted surveys on the many games made to educate and bring empathy towards a topic. While these papers do not necessarily study the extent to which empathy was achieved, the games they describe give us a better sense as to which qualities a video game has when it tries to bring out empathy in its players. For example, Papoutsis and Drigas survey a variety of games, citing the importance simulations and games hold in developing empathy because of their popularity and how they allow users to see an issue “from the inside” [32]. One of the games they found, *Migrant Trail*, focuses on the same topic of human migration. In this game, users can either play as border patrol agents or as the migrants themselves, experiencing what these groups might go through in real life. In an analysis of *Migrant Trail*, Boltz et al. cite the *agency* given to players as the main driving factor for generating a variety of different feelings, thus being a good way to create empathy [6]. This example shows how people seem to recognize the power games hold when it comes to teaching empathy, particularly in this topic of migration.

Empathy games even exist in popular culture, though are still rather niche even within the gaming community. One such example is *That Dragon, Cancer* (Figure 1.4a), a game where players play as a father raising a son with cancer, knowing that he only has a few more years to live [17]. The powerful subject matter along with the accompanying visuals, music, and most importantly, interactivity, allows players to make an emotional empathetic connection with the father, experiencing the highs and lows of such an situation. The creator, Ryan Green, even noted that they specifically chose the video game medium because of its ability to “[tell] a story the viewer can be present in” [1]. There have been a couple of papers that have looked at how this game in particular increase empathy, though these studies mainly focus on how it can be used to teach medical students within a formal educational setting. For example, Chen et al. looked at how *That Dragon, Cancer* can be used to teach empathy to psychiatry students within a clerkship curriculum, where they were able to find

an increase in empathy among students [9]. Similarly, Ma et al., inspired by Chen’s study, used the game in a virtual reality format to see if that could further help increase empathy, which they claim it did [25]. Ma’s study specifically targeted nursing students as well within undergraduate nursing programs.

Another notable example of an empathy game from popular culture is *Papers Please* (Figure 1.4b) by Lucas Pope, a game in which players play as an immigration inspector at a fictional border checkpoint, forcing users to make decisions on who to let through and who to deny entry by checking the documentation of immigrants [33]. The game was received highly by users because of its ability to immerse the player into this scenario, establishing empathy for the situations the inspector encounters [7]. For instance, the decisions players can make as the immigration inspector affect other families and even the player’s own family, which, despite them being completely fictional, actually allows people playing the game to establish emotional connections. For our purposes, *Papers Please* demonstrates that an empathy game can be created for the topic of migration to a great degree of success, so the importance of studying the effectiveness of these games cannot be overstated. Unlike *That Dragon, Cancer*, we were unable to find any studies that look at the effectiveness of *Papers Please* other than surveys talking about its empathy-generating qualities at a high level. With our work we hope to expand the literature of empathy games outside of medical education into broader humanitarian issues like human migration in the same way that *Papers Please* may be able to accomplish.

One final point to note about these games is that, looking across all past work related to empathy games, a common feature across these games is their simplicity and aesthetic appeal. These examples show is that empathy games do not need to be incredibly complex and realistic in order to effectively create empathy within players. Many of these games, including our game *Vida Migrante*, can be classified as simple “point and click” games, where the user interactions are quite minimal, and the emphasis is on immersion and storytelling. We find that this particular insight is actually reflected in the results of our study discussed in Section 3.3, where users felt particularly connected to the stories despite the simplicity of the game.

We acknowledge that despite being far more obscure than other more popular video games, there are still many empathy games out there, some of which have been studied. What is unique about *Vida Migrante* and this study is that our game not only is in a fairly underrepresented context (migration), but also that our game hopes to increase empathy *and* understanding towards the real data being used behind the scenes. Unlike most empathy games, *Vida Migrante* was designed as a data visualization project first and foremost as described in Section 1.1.4, so it is necessary to study whether or not the data can be effectively communicated and empathized with through the video game medium.

1.2.2 Testing for and Quantifying Empathy Creation

This subsection describes the existing literature when it comes to using video games to create empathy and how it is tested. The first tests for quantifying empathy began by specifically looking at how well people can share emotions with other people, as described in Dymond’s

work for example [12]. These tests asked questions on how people thought *other people* would rate themselves on a set of several personality traits. In these studies, higher empathy was correlated with a more accurate score, whether or not their predictions matched with how the other people perceived themselves. However, as explained in Section 1.1.3, the primary limitation to this is that you cannot perform this study if there is no “other” person to compare against.

Because of this limitation, the definition of empathy was broadened as well as the techniques used to quantify empathy. Much previous work that inspires this particular study uses *Likert-scale* or Likert-style questions (questions where users choose their answer from an N -point scale ranging from “Strongly disagree” to “Strongly agree”) to gauge how much empathy is brought out from users, the most notable being Mehrabian and Epstein’s Empathy Scale devised in 1972 [28]. Likert questions were cited as allowing researchers to quantify the level of empathy by letting users to answer questions on a scale rather than a binary yes/no response. For example, Ma et al. describe how they used *That Dragon, Cancer* in order to teach empathy to 69 nursing students, measuring empathy with a series of Likert questions [25]. The authors used these Likert questions to gauge how much empathy was generated from the game in VR when compared to playing the game on a normal computer, and found that more immersion leads to more empathy. For example, one of these questions was “I wish I could do something to help people like Joel and his parents,” where users could choose their answer from a 5-point Likert scale. As mentioned previously as well, Chen’s study on *That Dragon, Cancer* explicitly cite using the Jefferson Scales of Physician Empathy to quantify empathy, which also uses 7-point Likert-style questions [20]. Note that this scale is exclusively used in the context of health professions education and patient care and requires purchase to access, so it was necessary for us to create our own scale for the context of human migration. Outside of the medical and psychiatric context, Kletenik and Adler describe a game they used to encourage empathy towards accessibility in computer technology, specifically colorblindness [23]. This study also found an increase in empathy towards this issue due to the game. A variety of other works testing the effectiveness of games or simulations in creating empathy use these same Likert-scale questions, often using 7-point scales [18][8]. Given these examples this study seeks to replicate and expand on a similar line of work with *Vida Migrante*, to see if games can be used to create empathy towards this important topic.

Note that despite some drawbacks in its effectiveness, the Likert scale is still considered the most fundamental tool for analysis in educational research and measuring empathy [21]. Therefore, as described in Section 2.1.2, this study uses a similar process of using Likert-style questions to get a quantitative measure of empathy. The only deviation from the existing work is using a normalization method to get a clean value from 0 to 1, rather than a raw score.

Chapter 2

Methodology

This chapter outlines the methodology of the research. At a high level, due to the qualitative nature of empathy, the methodology involves a single user study that asked several questions related to empathy before users played the game, then asked them the same questions afterwards to see if any opinions have changed in a type of pre/post survey format.

2.1 User Study Design

This section goes through the overall design of the user study, which was a simple survey that users could go through with a researcher present. There were four sections of the user study. First, subjects answered basic demographic questions and questions about their prior knowledge on the topics (Section 2.1.1). Second, subjects answered “Cognition Questions” by going through several Likert-style questions to see how much empathy and understanding they already had towards the human migration topic (Section 2.1.2). Third, subjects played through the *Vida Migrante* game and vocalized their thought process and decision making to the researcher (Section 2.1.3). Lastly, subjects answered the same Cognition Questions, which we then compared against their original responses (Section 2.1.4). The last section also contained some additional questions about the game itself and how they felt about it, giving participants an opportunity to answer open-ended questions on their experience.

2.1.1 Demographic and Prior Knowledge Questions

In order to gain a layer of context for each participant, the user study first asked a series of demographic and general prior knowledge questions. The demographic questions could be used to see if there was a diverse set of perspectives on the topic, given that empathy and the study of empathy is rather open ended. The prior knowledge questions similarly allowed us to see how much people already might know about and be familiar with the subjects at hand (human migration and video games), which guides our analysis of the final results.

The demographic questions include race, gender, ethnicity, and education level while the familiarity questions asked how familiar participants are with human migration and video games, even asking questions such as if they know a migrant and how many hours of video games they play a week. Note that respondents were given the option *not* to respond to

Table 2.1: Cognition Questions (Empathy and Understanding)

| No. | Question | Positive |
|-----|--|----------|
| 1 | Migrants may face many challenges after making it to their destination. | Yes |
| 2 | I wish there was something I could do to solve the problems migrants face. | Yes |
| 3 | Migrants must make a series of tradeoffs to cover their basic needs. | Yes |
| 4 | Migrants are treated the same as citizens of the country they live in. | No |
| 5 | Organizations should help migrants integrate into the country they are now living in. | Yes |
| 6 | If I had the opportunity and resources, I would try to help migrants integrate into a new country. | Yes |
| 7 | The financial challenges migrants go through are more structural issues than personal issues. | Yes |
| 8 | Stories about migrants and the decisions they make makes me upset. | Yes |
| 9 | I am interested in learning about and understanding the migrant experience. | Yes |
| 10 | It is hard to see how migrants could face difficult experiences. | No |
| 11 | The situations that migrants go through may be exaggerated. | No |

(a) Questions are answered on a 7-point scale from Strongly Disagree (1) to Strongly Agree (7).

(b) If the question is “Positive,” the higher the agreement level the *more* empathy the user has.

any of the questions if they desired for the sake of privacy and comfort. However, as we see in the final discussion, these responses do actually seem to play a role in how users interact with the game and how much empathy they feel towards the topic.

2.1.2 Cognition Questions

To tackle answering the research questions directly, we created a survey with 11 qualitative questions that allows respondents to answer on a 7-point Likert-style scale from “Strongly Disagree” to “Strongly Agree” for each question. These 11 questions are referred to as the **Cognition Questions** in this report, and they are displayed in Table 2.1. Each cognition question aims to answer either the empathy research question or understanding research question (Section 1), and some questions try to answer both—a diagram of this is depicted in Figure 2.1. Despite the qualitative nature of the questions, the response is quantitative due to the score being a numeric value from 1 (Strongly Disagree) to 7 (Strongly Agree). As explained in Section 1.2.2, we added up all the scores for the 11 questions to determine a final “**Empathy Score**” (E).

One caveat of this approach is that some cognition questions are **positive** (represented in the set Q^+) while others are **negative** (represented in the set Q^-). A question being “positive” means that the higher the score (i.e., answer is closer to Strongly Agree), the more empathy or understanding the user is demonstrating, while a question being “negative”

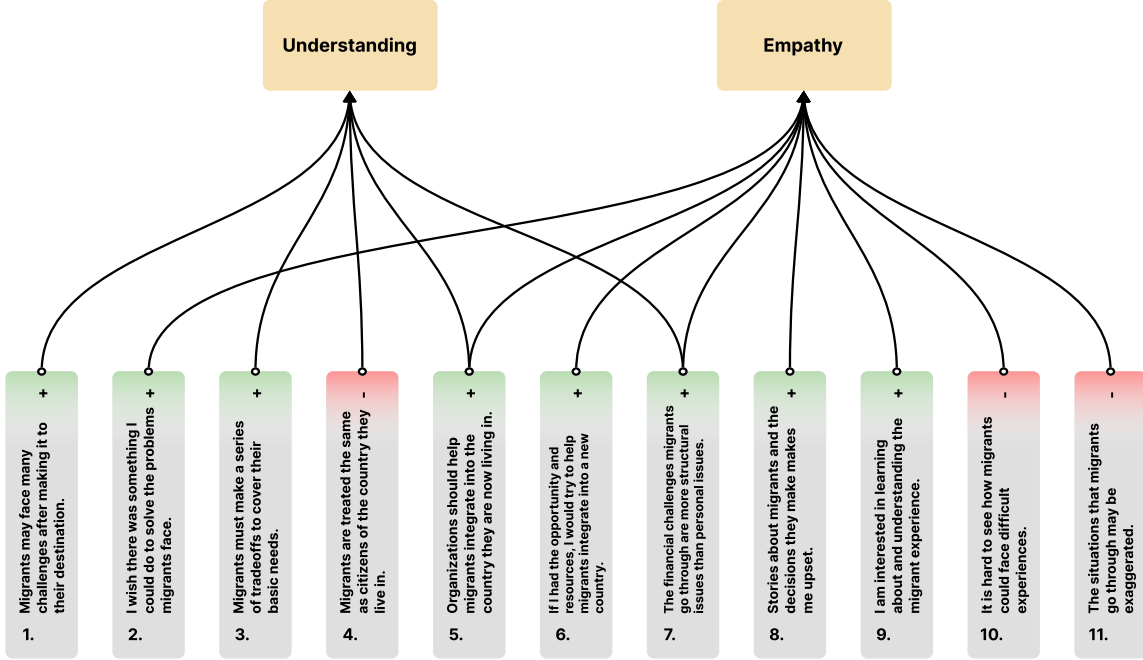


Figure 2.1: Graph mapping Cognition Questions to their targeted research question, empathy and/or understanding. Positive cognition questions are highlighted in green, while negative cognition questions are in red.

means that a higher score corresponds with less empathy and understanding. Taking this positive and negative distinction into account, the final Empathy Score for each user was calculated by adding up the score of the positive cognition questions and *subtracting* the score of the negative questions (see Equation 2.1). This leaves us with a raw Empathy Score (E_{raw}) ranging from $E_{min} = -13$ (least empathy) to $E_{max} = 53$ (most empathy). Given this information, we could then compute a cleaner, normalized Empathy Score (E) using simple normalization.

$$E_{raw} = \sum_i Q_i^+ - \sum_j Q_j^- \quad (2.1)$$

$$E = \frac{E_{raw} - E_{min}}{E_{max} - E_{min}} \quad (2.2)$$

E is now a value that ranges from 0 (most *apathy* or least empathy) to 1 (most empathy). This final empathy score could then be used to determine the changes in empathy for each participant in the study, before and after playing through the online simulation game. See Appendix B for the final code that calculates both the raw and normalized scores.

For a more detailed breakdown of the empathy score, we first note that 0.5 represents a neutral stance, which indicates that the respondent felt neither empathy nor apathy. This

Table 2.2: Open-Ended Questions

| No. | Question | Details |
|-----|--|---|
| 1 | If you felt like you learned something new, what was it? | Respondents first answer a yes or no question on whether or not they learned something new, then answer this optional question. |
| 2 | How did this game make you feel about the migrant experience? | Aimed to get a qualitative measure on whether or not empathy and understanding was generated. |
| 3 | Feel free to include any additional notes/follow up questions here | Respondents could leave any comments about the game here, particularly on game quality and suggestions for improvement. |

neutral score most likely comes from a respondent having unformed opinions. Second, for understanding questions, a 0 represents a lack of understanding in the situation, perhaps even having misconceptions of the situation. A 0.5 represents neutral understanding, where the user may or may not be understanding, or chooses not to state an opinion. It follows then that 1 represents complete understanding of the situation, correlated with the most empathy given the design of the questions.

2.1.3 Game Playthrough

The third section is where participants explored and played through the online simulation game *Vida Migrante*. This section was the crux of the study, as not only could users learn about and empathize with human migration, but we could also get a glimpse into *how* users approached the material. During this section we asked subjects to explain their thought processes throughout the game. Participants could make comments about the material they were exploring, any issues they saw with the game, and most importantly, their thought process as they made decisions that real migrants may need to make. As seen in the discussion section, these comments by participants reveal particularly insightful findings on how users gain empathy and understanding as they go through the game. Because of how important it is to hear these comments from participants, this section of the study was conducted as a one-on-one meeting in an in-person (or virtual) setting.

2.1.4 Post-playthrough Questions

As in section 3 of the study (Section 2.1.2), the fourth and final section asked the same cognition questions so that we could compare participants' feelings before and after the playthrough. For instance, once the empathy score had been calculated before the playthrough (E_{before}) and after the playthrough (E_{after}), we could calculate the change in empathy and understanding, giving us our final quantitative results. Note that for a more meaningful

measure, the *percent change* ($\Delta E/E_{before}$) of these values is used in the final results and discussion.

$$\Delta E = E_{after} - E_{before} \quad (2.3)$$

For more qualitative results, the survey asked additional followup questions on the users' experience with the game listed in Table 2.2. These questions provided us with rich, open-ended feedback that we could use to determine how successful the game was in generating empathy and understanding towards the topic of human migration. As discussed in the results section, open-ended question 1 was particularly useful for gauging changes in understanding (Section 3.4), while question 2 was crucial to seeing changing in empathy (Section 3.3).

2.2 Logistical Details

The surveys for this user study were conducted as one-on-one in-person meetings (or virtual through the Zoom web platform). Meetings were time-blocked to be an hour long, though were free to run shorter or longer depending on how long the user spent on the game. Meetings were scheduled through Calendly and were conducted at any time during the week. The survey itself was a Google Form which stored results in a linked Google Sheet which was later used for analysis. When the surveys began, participants were given a brief introduction to the study and the 4-section survey was explained. The participant then signed a consent form and was free to fill out the survey up until section 3, at which point they were given additional context on how to think out loud (see Section 2.1.3). Participants played through the game for as little or as long as they wanted, throughout which the researcher would take notes on specific comments they made and even actions made in the game that weren't vocalized, gathering insights and feedback. Once done with the game, participants then returned to the survey to fill out the remaining questions in section 4. The participants were then thanked and were free to leave once the Google Form had been submitted.

2.3 Respondents

At the end of the study, a total of 52 respondents were surveyed and played the online simulation game over the course of a month. A more thorough analysis on the respondents' demographics is performed in the results section, but at a high level all 52 respondents were college-aged students (ages 18-29) at the Massachusetts Institute of Technology. As discussed in Section 3.1, this may introduce some biases in the analysis, but we believe that the results of the study provide great insights regardless.

Chapter 3

Results

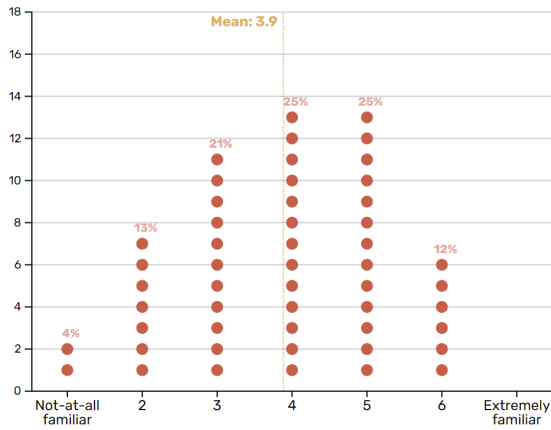
The data from our survey reveals fascinating information and allows us to make unique insights into not only the power of video games for generating empathy, but also for why empathy generation is important in the first place. This chapter discusses several key take-aways and insights made by respondents from playing the game, showing how it generates empathy both on a quantitative and qualitative level. We find insights not only in how empathy and understanding was generated, but also in the respondent demographics and their prior familiarity with the subjects. Note that within the qualitative discussion, reference to numerous quotes are made using the format <Respondent ID><Quote #> (for example, 15d represents the fourth quote from respondent 15). These quotes were taken from the respondents live as they were playing the game, not from the written survey responses themselves. As such, many quotes may be paraphrased, but their intention is maintained as much as possible.

3.1 Caveats and Potential Biases

Before going into detail on the changes in empathy and understanding due to the game, it is important to note a couple of biases discovered given the demographics of our respondents, which is explained in more detail in Section 3.2. We found that the entirety of the respondent population already knows a migrant and is in college or college-educated, and so despite the normal distribution of familiarity with the migration topic displayed in Figure 3.1a, most respondents already had some sort of empathy towards and understanding of migrants and migration. Despite these caveats, targeting this part of a global user base is still important in showing how games can be used to increase empathy and understanding. As we show in Section 3.3, there is a real and significant *increase* in empathy despite already high empathy and understanding. Additionally, and perhaps more importantly, these results can still help us show which aspects of video games can help increase empathy generation among its player base.

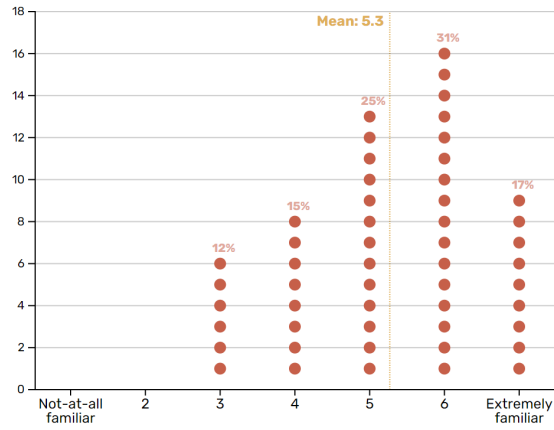
Another important caveat is that cognition question 10 (“It is hard to see how migrants could face difficult experiences”) was also dropped from the set of cognition questions because of its ambiguity. While the use of “hard to see” was meant to equate to whether or not users found the migrant situations real or not, many respondents thought it meant a “difficulty”

Familiarity with Migration
 How familiar are you with the topic of human migration as a whole?



(a) Migration Familiarity

Familiarity with Games
 How familiar are you with online games/video games?



(b) Video Games Familiarity

Figure 3.1: Distribution of familiarity with the topic of migration (left) as well as video games (right). The distribution of migration familiarity is fairly normal while the distribution of video game familiarity is skewed more to the left (mean familiarity of 5.3).

or “pain” in seeing the migrant situations. This led to some respondents interpreting the question “correctly,” where the raw score decreased since they found that the migrant experiences were in fact real, while on the other hand scores increased since they empathized more with the situations and found it “difficult” to see them in those situations. Even though this question does not contribute to the quantitative results regarding empathy generation and understanding, we can still see evidences of how respondents approached this question by their words and actions when playing the game. These qualitative findings are further explored in Section 3.3. Note that because of the removal of this question, E_{min} and E_{max} were adjusted accordingly for the normalization calculation to -6 and 54, respectively (see Section 2.1.2 for details on this calculation).

3.2 Respondent Demographics

One of the main findings related to respondent demographics was the fact that there was a great diversity in their familiarity with the topics discussed in the survey, namely migration and games. First, Figure 3.1a shows the distribution of familiarity with the topic of *migration* (specifically asking the question “How familiar are you with the topic of human migration as a whole?”). This distribution is fairly normal, with 38% of respondents having less than neutral (< 4) familiarity and 37% of respondents having more than neutral (> 4) familiarity. This equal distribution weight on both sides means that the average familiarity score is 3.9 with a standard deviation of 1.35. Second, we found that respondents were slightly more familiar with video games (mean familiarity of 5.3), perhaps due to the younger audience that was surveyed—47.2% of respondents were between the ages of 21 and 29, and the remaining

52.8% were between 18 and 20. Figure 3.1b shows this particular distribution. Note that 9 out of the 52 respondents ($\approx 17\%$) reported “extreme familiarity” with the subject. In fact, more than half of respondents (52.9%) reported playing 1 or more hours of video games per week. Higher familiarity with the subject of video games supports the need to use them in education and empathy generation; a familiar medium may be enticing for users, even if they know that the subject matter it covers may not be as fun or engaging as a traditional game. Despite the respondents having a higher overall familiarity with video games, we still managed to achieve a relatively diverse set of users, given the standard deviation of the familiarity score being 1.25.

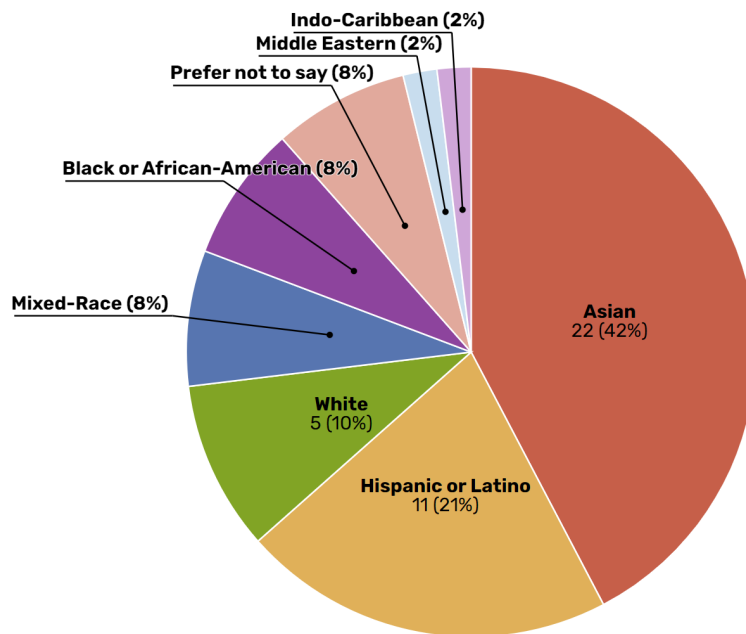


Figure 3.2: Breakdown of self-identified race and ethnicity of respondents. Note that 4 respondents ($\approx 8\%$) declined to self-identify.

Another interesting insight that came from the respondent demographics was the fact that *all respondents* (100%) personally know someone who is an immigrant or has migrated from another country. This is most likely due to the fact that the demographic target of the study was MIT students with 58% of the undergraduate population being part of a minority group, and the fact that immigrants comprise a significant 14% of the national population [13] [3]. From our own data, we noticed an even higher amount of diversity in the race and ethnicity of our respondents than the official university figures, which can only increase the chances that they know migrants. Figure 3.2 shows a breakdown of the race and ethnicities of all 52 respondents. Excluding those who declined to self-identify, 89.5% of respondents (43 total) were mixed-race and/or part of a minority group in the United States. Despite these demographics and all respondents knowing a migrant, we still see variable familiarity with the topic of migration as shown in Figure 3.1a. This supports a curious insight where, even though everyone knows a migrant, their familiarity with migration as a whole might not be as great. This finding further emphasizes the importance of teaching about this topic

and building empathy towards it. People may find benefits in empathizing and connecting with the migrants they know, and may be better informed about the subject when coming to their own conclusions about it. This trend could be similar with other topics, so it is important to find ways to teach about it and generate empathy, hence the game.

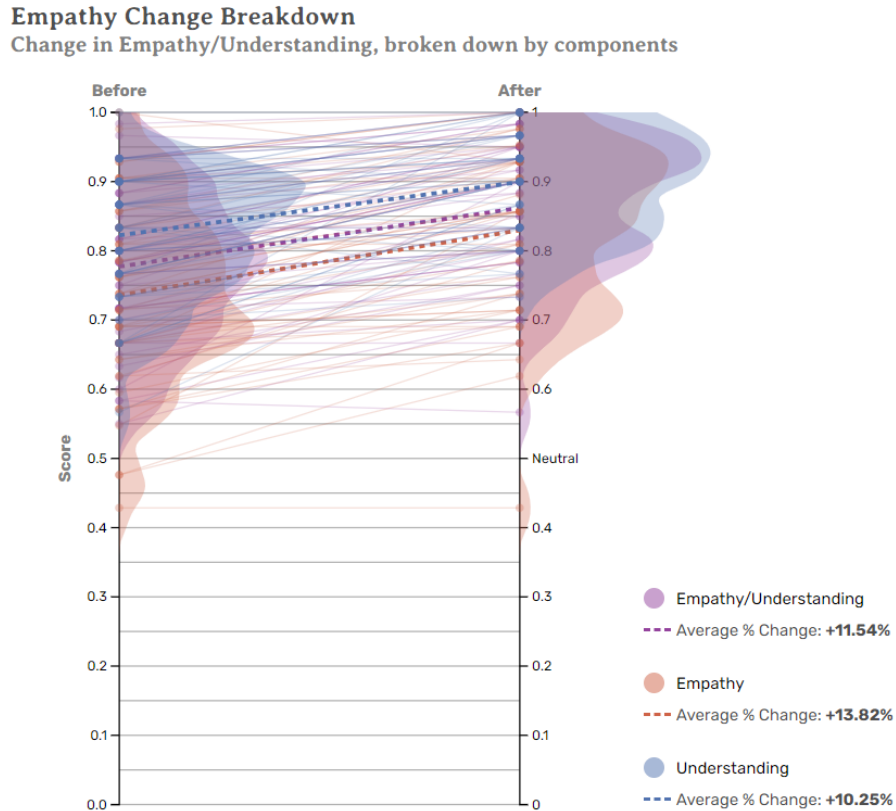


Figure 3.3: Summary of respondents’ empathy scores before and after playing the online simulation game *Vida Migrante*. Scores are broken down into 1) the final combined scores of empathy and understanding (purple), 2) the scores given *just* empathy questions (red), and 3) the scores given *just* understanding questions (blue).

3.3 Changes in Empathy

Figure 3.3 provides a holistic summary of the empathy scores across all 52 respondents. Overall, as prefaced in Section 3.1, baseline empathy for the respondents was already quite high with general empathy/understanding at **0.78** before playing *Vida Migrante*. Breaking this down into the empathy and understanding cognition questions, average empathy started at 0.74 while average understanding started at 0.82. Recall from Section 2.1.2 that a value of 1 represents most empathy, 0.5 represents a neutral stance, and 0 represents least empathy (or most apathy). Despite these already high empathy scores, there was still increases in empathy

and understanding across the board. More exploration into the “understanding” results is done in Section 3.4 along with qualitative evidence demonstrating how understanding increased. This section focuses on overall empathy/understanding and empathy on its own, as it is the crux of this research.

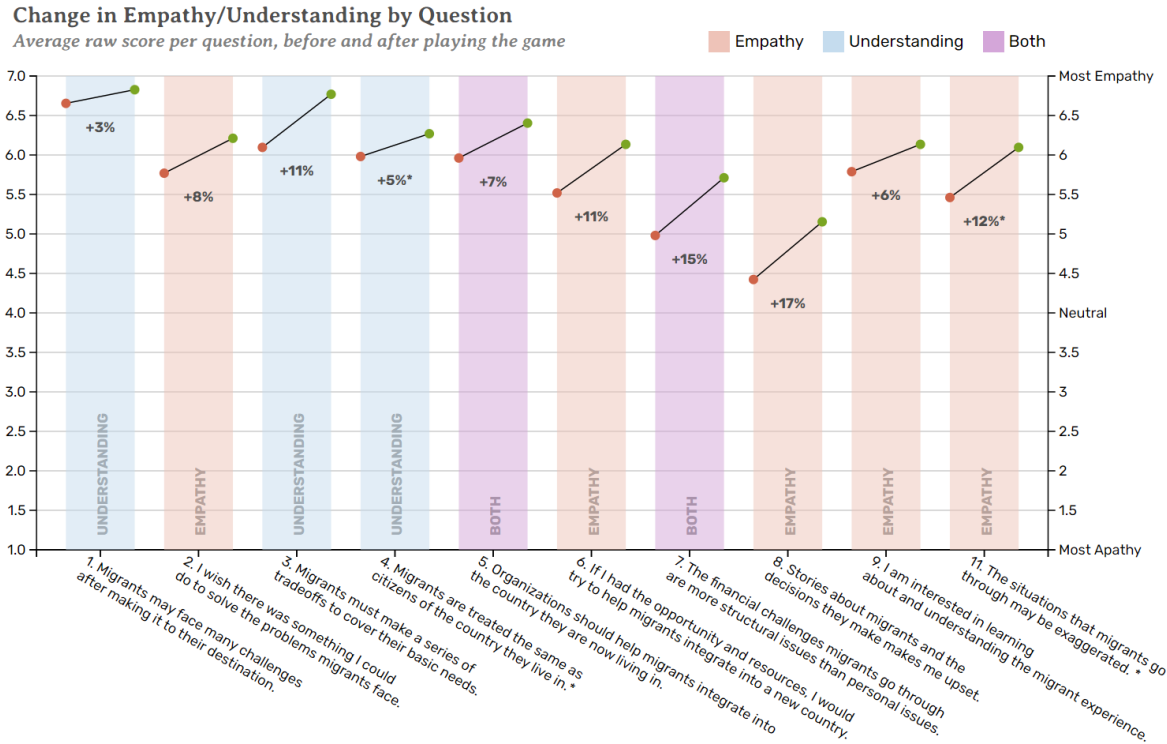


Figure 3.4: Average raw empathy scores before and after playing the online simulation game *Vida Migrante*, broken down by cognition question. Questions with an asterisk (*) are *negative* and have been normalized, as explained in Section 2.1.2.

On a quantitative level, overall empathy/understanding saw a significant increase from *before* playing *Vida Migrante* ($M = 0.78, SD = 0.11$) to *after* playing the game ($M = 0.86, SD = 0.10$), $t(51) = 10.5, p < 0.01$. As referenced throughout the rest of this section, this corresponds to a **11.54%** percent increase. On its own, empathy increased similarly by 13.82% on average from $M = 0.74, SD = 0.13$ to $M = 0.83, SD = 0.12$ ($t(51) = 9.89, p < 0.01$). As an important side note, this distinction between increases in empathy *alone* (compared to increases in empathy *and* understanding) is calculated by only factoring in questions specifically targeting empathy. To make this clearer, Figure 3.4 breaks down the change in the raw score *per question*. Overall empathy/understanding factors in all 10 questions in the analysis, while empathy alone factors in only the questions indicated in the red and purple bars. Looking at the distribution as a whole, which again is shown in Figure 3.3, the vast majority of respondents showed *increases* in empathy after playing the game. In fact, some respondents showed rather stark increases in empathy; for example, Respondent 4, starting with a relatively neutral overall empathy score of 0.6, ended up with a final

score of 0.9 after playing the game, a 50% increase. Looking at empathy on its own, two respondents (Responses 10 and 46) crossed the threshold from “apathy” to “empathy.” Both respondents started at an empathy score of 0.48 and ended at 0.67 (40% increase) and 0.62 (30% increase) respectively after playing the game. Notably, both respondents stated that they had never previously held an opinion on migration before. This may give a potential glimpse into how games can be used to increase empathy even among those that may not be already empathetic. On the other hand, exactly 2 out of the 52 respondents (Responses 8 and 9) showed a *decrease* in overall empathy and understanding. It is difficult to determine the exact cause of this decrease, but some potential reasons based on the individual response data are that they over-empathized with the migrant situation, or simply did not react well to the simulation. Further studies may need to be done to provide better explanations for these decreases in empathy. Figure 3.5 provides a clearer picture of the distribution of these changes in empathy by representing the changes in box plots. We confirm in this figure that, although most respondents reported an increase in empathy, there were some respondents that showed decreases. Additionally, the box plots show the outliers in the other direction as mentioned above, where empathy and understanding increased precipitously.

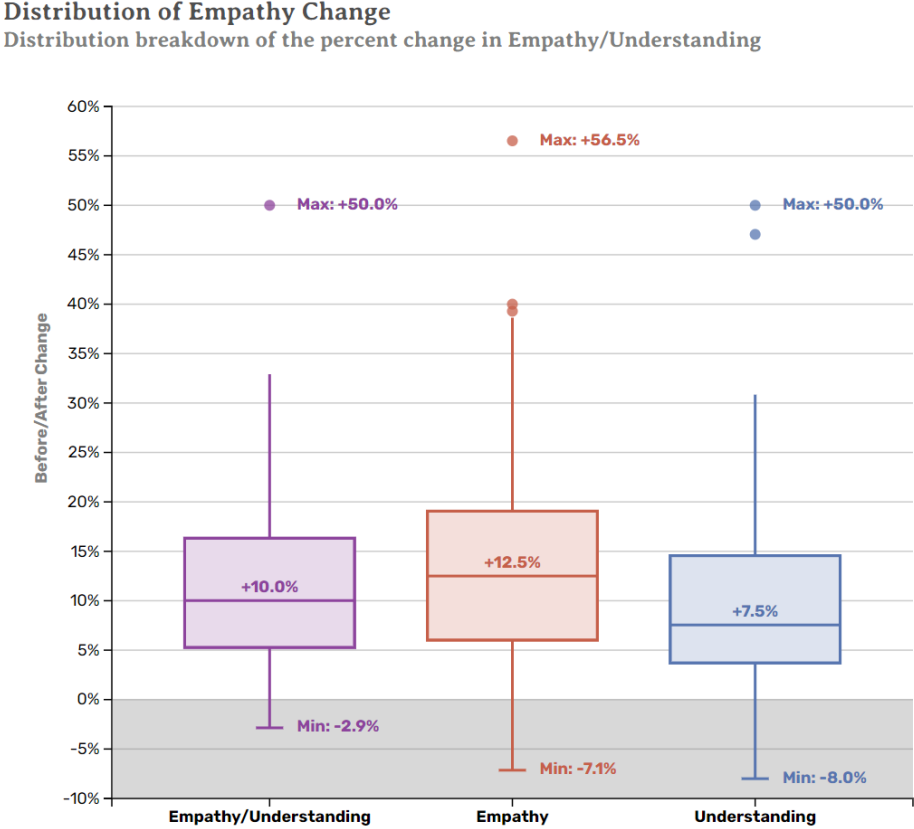


Figure 3.5: Box plots showing the distribution of the percent change in empathy/understanding. Similar to Figures 3.3 and 3.4, the color represents whether or not values are broken down by empathy, understanding, or both empathy and understanding.

This increase in empathy is quite significant, showing that even respondents that previously had high empathy still gained additional empathy towards the subject of migration. Additionally, Figure 3.6 shows an interesting trend that appears to arise, where the lower the starting empathy score is, the greater the percent change in empathy is, however this may come naturally partly from the fact that high scoring respondents probably won't increase their empathy much because there is not much more to increase by. As mentioned in Section 3.1, unfortunately we were unable to survey respondents that had a starting empathy score below neutral (0.5), shaded in red in Figure 3.6, so there is a gap in our data. It would be interesting to explore in future work how the points in that shaded region would appear. For example, would the linear trend continue, showing that users with no empathy towards the subject could gain a lot of empathy? Or would the trend line form an arc where people with lower starting empathy are less willing to increase their emotional connection with the migrants and their living situation. See Section 4.3 for a more in-depth discussion on future work.

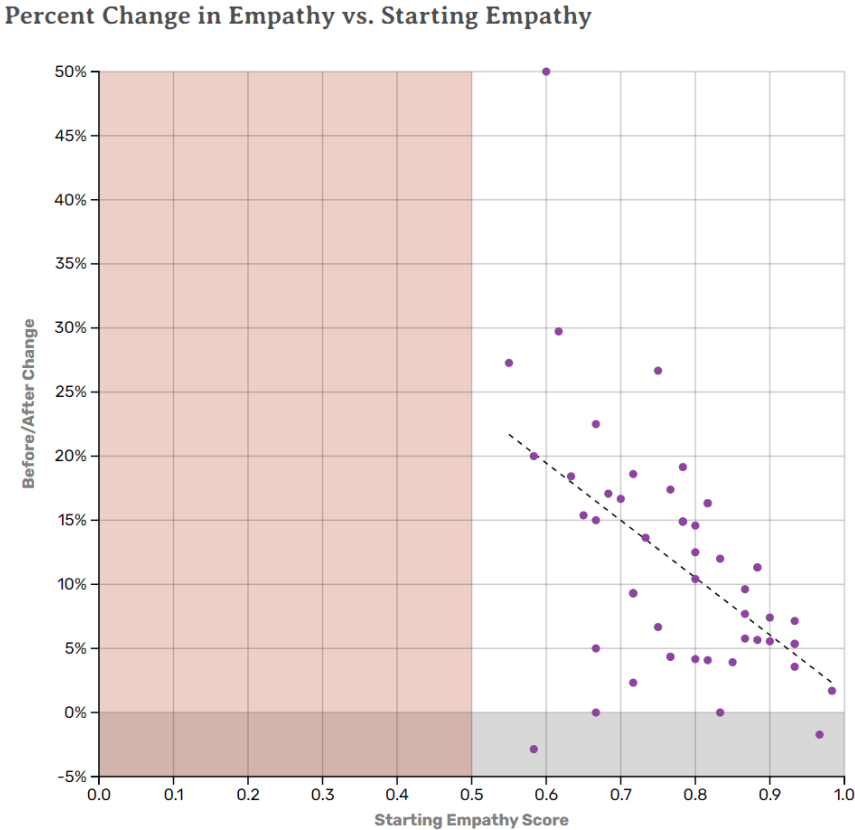


Figure 3.6: Scatterplot showing the percent change in empathy as a function of the starting normalized empathy score, before playing the game. The linear regression line loosely suggests that there is a negative correlation.

While this quantitative data reveals important insights into how empathy has increased, we can also see a lot of qualitative indicators of this increase in empathy from the things

that people said during the interviews (a benefit of performing in-person synchronous interviews). The following subsections dive into this qualitative analysis of the different aspects of empathy that saw increases, with some additional quantitative data to support the findings.

3.3.1 Familiarity with In-Game “Characters”

The first key insight we found during the study was that players really connect to the migrant profiles in the game. The primary example of this connection is in the migrant selection process as described in Section 1.1.4, where respondents often chose to play as the character *they related the most to*. This connection and relatability support the “familiarity” facet of empathy generation, where the more familiar they were with the characters and their situations the more likely they were to activate certain parts of memory that established an emotional connection.

One of the leading examples of this during the study we found is that many young women chose to play as Génesis, the only young, single woman out of the 4 migrant profiles they could choose from. Statements like “She aligns more with me” (12a), “I can make the best decisions for her” (15a), “[She is] more relatable” (34b), and “[She] feels like the closest one to me” (26b) show that young women may feel the most comfortable playing as someone like them, affording greater relatability and thus creating a stronger emotional connection to them. Of course, this trend was not limited to women, as men tended to choose other men to play the experience as, such as Respondent 17, stating that “I chose a man because it’s more relatable” (17a). Aside from choosing the migrants they related to the most, many respondents chose migrants they were most *familiar* with, regardless of whether or not they related to them on a personal level. Some respondents had even indicated that they were already somewhat familiar with the migrant experience either from their own lives or the lives of someone close to them. As evidence of this, one of the migrant profiles the users could select was Luis, a married father of 4 children, and while many avoided choosing this profile (see Section 3.4.1), some specifically chose that profile because they were most familiar with it. One respondent noted that “[Luis] almost sounds like my dad” (28a), with another explicitly stating that “Luis’ family is similar to my dad’s family” (10b).

Importantly, not everyone picked a migrant they related to the most or were most familiar with. Many respondents simply picked a migrant based on “vibes” or whoever caught their eye first without explicitly stating a reason why they chose that migrant. However, we still saw an overall increase in empathy among those respondents after playing the game. This emphasizes the importance in highlighting several features of video games in order to create the most empathy as one single feature may not establish that strong emotional connection. The following sections show other ways that people built their empathy and emotional connection towards the characters and their situations. Despite it being difficult to show how empathy increased quantitatively in this section, these next sections provide that extra layer of analysis and evidence based on the specific cognition questions we asked during the survey.

3.3.2 Stepping into the Shoes of the Migrants

Many respondents not only cited a strong connection with the migrant profiles, but with the migrant experience itself. This subsection outlines how users “stepped into the shoes” of the migrants as they made the decisions presented to them in the game. These findings demonstrate the “simulation theory” facet of empathy generation described in Section 1.1.3, where it is clear that players were able to reproduce the thoughts and experiences the migrants would have in real life. What is fascinating about this finding is that is never a time in the game where migrants are shown making decisions; instead the player makes all those decisions on their own. Despite this, we were still able to find empathy generation that reflected this simulation theory. This may further suggest that the interactivity of video games can be an incredibly powerful tool for empathy creation and connection with these experiences, even if they are unfamiliar.

Quantitatively, we look to Cognition Questions 2 and 6 to see how the respondents’ empathy increased after playing the game due to this emotional connection they had with the migrant experience. Question 2 saw an 11% increase in the average raw empathy score towards “wishing they could help the migrants.” Question 6 saw a similar 11% increase the average score where respondents would “try to help migrants integrate into their new country if they had the resources.” While not a particularly large change, these increases show that people may be establishing emotional connections with the migrants by playing this game, hoping more and more that they could help their situation. Note also that these increases occurred even among respondents that already had relatively high empathy.

Respondents also provided a lot of qualitative insights into the empathy generated from stepping into the shoes of migrants. One of the most revealing findings was the heavy use of *first person pronouns* (I/my/me) when describing their actions. Some examples from the respondents included statements like “**I** have a lung disease” (20a), “**I** have a partner” (4b), “Let’s help **my** friend” (35b), “Cash benefits **me** now” (14c), and “**I** need more money” (20b). The heavy use of these pronouns as people walked through the game reinforces this idea that people really feel as if they are the migrant making these decisions, which is possible precisely because the video game format allows you to do that.

Furthermore, some respondents indicated out loud that the simulation game made them feel as if they were experiencing a real situation, or if they were reliving a past experience. The vocabulary and phrases respondents used hinted at the strong emotional, empathetic connection with the migrant situation and the decision making they need to do. Despite the game being a simulation, many said phrases indicating that the experiences felt real to them. Some showed that they shared the risk that migrants may take in real life, saying things like “I’m not sure that I can take that risk” (31e) and “I’ll risk it and borrow money, it’ll cost more down the line to treat it” (13d). Others showed commitments to personal improvement that migrants might make, such as in “I’m going to invest in my education” (36c), “Since I have time I can help out the community a bit” (49b). Some even showed signs of anxiety, whether or not it was real or perceived through the lens of the simulation, in “I don’t want to keep feeling anxious about it” (33e). These real emotions and feelings—risk, personal improvement, anxiety, and more—show the emotional connection people have with the migrant situation as established by the game, reinforced by the continued use of

first person pronouns. Several *interjections* even made it into the things that respondents would say while playing through the game. Several respondents showed clear shock and surprise when they were evicted, interjecting with things like “Noooo” (2a) and “What?? Why did I get evicted!” (46c). Short phrases like “Jesus” (48c) and “That sucks” (37c) also made appearances during certain life events. Interjections like these show engagement and emotional connection, potentially another piece of evidence that empathy was created.

Of course, not all respondents showed this level of visible (or rather, audible) connection with the experience, as some still treated the simulation from an outside, third-person perspective. More subtle examples of this include when the respondent’s referred to the migrant they were playing as from a third-person perspective, such as in “Nooo **he’s** sick” (43c) and “**She** might not be believed” (16f) (note the use third person pronouns rather than first person). Others were more explicit in their “disconnect” with the migrant, saying things like “If I were him” (40a) or “I’m not actually working these hours” (29b). Despite these findings, most respondents still reported increase in empathy, most likely due to the engagement with the game and not simply due to complete connection for the migrant. As evidence of this, one of the follow-up questions after completing the second round of cognition questions asked how engaged users felt with the simulation, with the distribution of responses shown in Figure 3.7. What we found is that the vast majority of respondents, 49 or 94% of them felt that the simulation was engaging. In fact, 35% of respondents *strongly agreed* with the statement that the game was engaging, the highest possible engagement score.

Lastly, given this finding of player engagement, one observation during the study was that many respondents chose to play again as a different character to see what their experience would be like. While unfortunately we were unable to capture a figure for the exact percentage of respondents that did this, the observation similarly shows how people were engaged in the game. Cognition question 9 reinforces this finding, where there was a 6% increase in sentiment that people wanted to learn more about the migrant experience. Some even noted this in their open-ended responses; Respondent 31 explained how the game “made me feel more interested in learning more about the migrant experience and feel a stronger need to do whatever I can to serve migrant communities around me,” while Respondent 39 wrote how it “makes me want to explore and learn more about this topic.” This may provide a reason why many respondents wanted to experience and learn about the lives of different migrants in their play through by playing multiple times.

3.3.3 Shared Feelings of Distress and Hopelessness

One of the primary goals of *Vida Migrante* is to bring the struggles of migrants to light and help people empathize with those struggles. As we observed during the user study, we indeed found that a lot of respondents ended up having empathy towards such struggles. Not only is this shown in the connection to the migrant profiles and the migrants experiences, but also, as this section explores, the recognition that migrants go through a lot of stress. Given that *Vida Migrante* provides players with a lot of context surrounding their situation, these particular findings support how empathy is generated through the “Perspective Taking” approach, where players infer the mental state of the migrants given the information provided to them, and then *imagine* how they would feel in that situation.

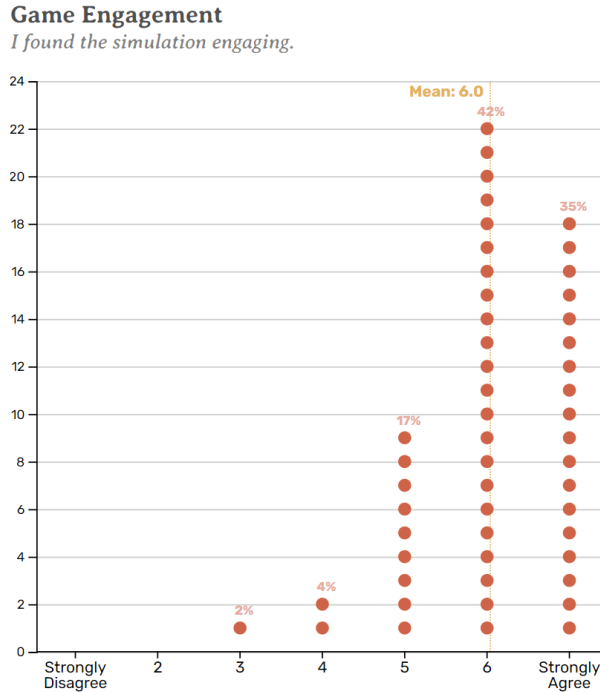


Figure 3.7: Distribution of levels of engagement with the game.

Quantitatively, cognition questions 8 and 11 demonstrate how, after playing the game, people increased their empathy specifically because they saw how stressful and often times hopeless the situation felt (Figure 3.4). For example, we saw an overall 17% increase in respondents being upset towards stories about migrants and the decisions they make, the largest increase out of all the cognition questions. Regarding question 11, asking respondents whether or not they thought that migrant situations are exaggerated, we saw a 12% increase in empathy after normalization. Note again that since this question is “negative,” an increase in score means that *fewer* people thought that the stories were exaggerated. The key takeaway from this quantitative data is that respondents overall found that the situations they were faced with are not only upsetting, but also incredibly real.

Going through the study we noticed that the things respondents said also supported these findings. Respondents often verbally exclaimed how the migrant situation and the decisions they had to make were stressful or upsetting. For example, one respondent reacted with “It’s kind of sad” (26c) when realizing they could not help a relative with remittances because they did not have enough money. Similarly, another noted how “It hurts” (7c) when they chose not to help the community because they had no time. Many other respondents cited feelings of hopelessness and being in dire situations, saying things like “There’s no way to survive” (15b), “Life is so hard” (15c), “Either I borrow [money] or I die” (25a), and “This is horrible” (44a). Most notably, some respondents indicated in the open-ended followup questions that they themselves started to feel stressed or hopeless, or at least acknowledged how it might be easy for a migrant to feel that way, showing large amounts of empathy. Respondent 5, for example, specifically stated how the game made the migrant experience

feel “very stressful and almost impossible.” Similarly, Respondent 43 wrote in the follow-up question how they felt “hopeless and helpless” when playing through the game. Respondent 13 claimed that “I felt a bit of stress as I imagined myself in their shoes,” showing a clear emotional connection and an increase in empathy because of this shared feeling of stress. Respondent 28 noted that the game “made me feel sad and stressed for all the stuff [migrants] have to go through.” All of these examples and more show people playing the game were able to fully imagine and experience the migrant situation in their own minds because of all of the context and interactivity the game was able to provide.

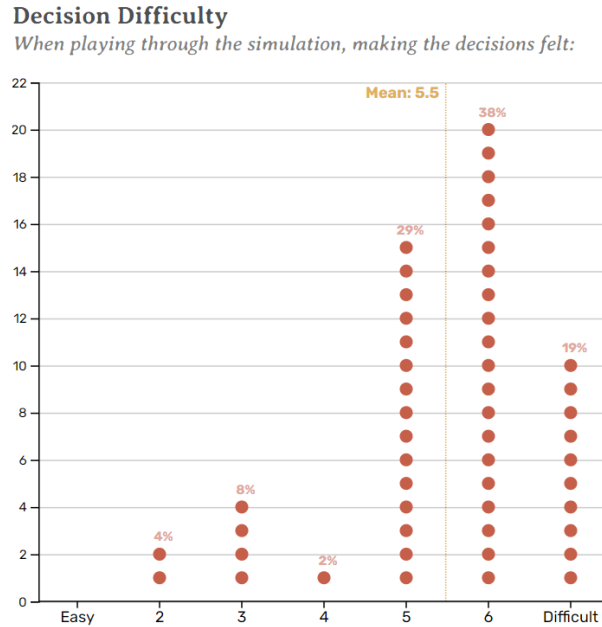


Figure 3.8: Distribution of how *difficult* making decisions was within the game.

Taking a somewhat different perspective, we also asked respondents in a followup question how *difficult* it was to make the decisions presented to them as these migrants. The difficulty and time it took to answer the questions may demonstrate the weight of the decisions and how it made those decisions feel more *real* to players. Figure 3.8 shows this distribution, where a 1 on the left represented decision-making being easiest while 7 on the right represented decision-making being hardest. Similar to the responses on game engagement, we found that the vast majority of respondents (86%) found the decisions to be difficult to some degree, a score of 5 or higher. Some respondents even mentioned this difficulty in their open-ended responses, saying things like “the choices involved are a lot more difficult than I expected” (Response 6) and “migrants have a lot of difficult and unfair decisions” (Response 10). This also contributes to the *understanding* people gained throughout after playing the game, realizing the the decisions migrants have to make are in face extremely difficult (see more in Section 3.4.1). Six respondents (12%) found the decisions to be on the easier end, though we believe that this may be due to the fact that some of the scenarios in *Vida Migrante* only allowed for users to select a single option, a limitation in the game. It is possible that the

difficulty respondents found in making decisions reflected their empathy towards the migrant situations, since it was clear they were connected with the migrant and not just treating their situation like a game with no consequences, despite it actually being a game.

Although the game was not completely perfect during testing, these examples show how it is absolutely possible for a video game can be used for empathy generation through the perspective taking approach.

3.3.4 Specific Mentions of Empathy Generation

As a final piece of evidence that *Vida Migrante* was successful on the empathy creation side, many respondents actually cited their own increases in empathy and emotional connection to the migrant experience directly from playing the game. This was done either through the emotions displayed in their words or through specific indications that they gained more empathy. On the emotional aspect, many people mentioned how the situations were sad or upsetting. We already mentioned how quantitatively there was a 17% increase in the sentiment that the situation made respondents feel upset, yet they nevertheless indicated this in the open-ended responses. For example, phrases like “Some of it was infuriating” (Response 3) and “It made me feel sad about the situations people have to go through” (Response 34) qualify this increase.

Similarly, many respondents noted how they felt more *sympathetic* towards the migrant experience. While sympathy, a more specific feeling of concern towards someone experiencing pain or difficulty, is not the same as empathy, sympathy is a good measure on how empathetic people can be because they are already displaying signs of understanding the emotions of others and “feeling” them in a perhaps less explicit sense [29]. In other words, sympathy can be considered a *result* of empathy towards a person if that person is going towards difficult or stressful situations, which is often true in the case of migrants. Respondents wrote in the open ended questions how the game made them “feel sympathetic to the migrant experience” (Response 13), with Respondents 1, 17, 41, and 50 saying almost identical things. To show how empathy is correlated with these mentions of sympathy, often times respondents would add specific mentions of shared emotional connections with migrants. For example, Respondent 13 followed up in their response saying “I felt a bit of stress as I imagined myself in their shoes.”

Notably, of course, there were the actual mentions of empathy generation, not only because of the material that was presented, but also because of *how* it was presented in the form of a game. First, Respondent 4 wrote how “the game made me experience and empathize with the difficulties that migrants face in a more tangible way,” then cited particular reasons as to why, such as how the game put them through “emergency situations” that prevented them from making personal progress. Note that the second half of this quote gives us evidence that a general sense of *understanding* was created, which is further discussed in Section 3.4. Other respondents additionally wrote that the game made them feel “deeply empathetic and frustrated” for the migrants (Response 12), and how it made them “feel a lot more empathy” (Response 33), which demonstrates how even those that already had empathy gain more from playing the game. Importantly, in their mentions of empathy increases, some respondents

admitted that migration is “not something they think about often,” such as Respondents 17 and 33. The results of cognition questions 2 and 6 demonstrate this, as many people may be inspired to “think more often” about migration and help their cause in whatever way they can. Even in their quotes, respondents mention how they “feel so bad” that they “can’t help” (5b) or that the game really makes them want to “do something to provide aid to such migrants” (Response 38). Even the people most familiar with migration noted how the game was able to increase their empathy. Respondent 8, for example, a migrant himself, noted how “it made me feel empathy towards my family members who have gone through similar situations.” One respondent even said that they think the game is “really good at teaching people empathy” (33f). Looking back at the distribution Figure 3.1a and at these quotes, it is clear that empathy increased across the board regardless of the initial familiarity with the topic of human migration.

Lastly within the realm of empathy generation specifically, as mentioned in Section 1.1.4, we wanted to see how users would perceive the migrant data given that *Vida Migrante* visualizes real data from real migrants in a video game format. Inspired by William Allen’s adaptation of Andy Kirk’s typology of data visualization, we asked four questions in a similar Likert-style of how much the game help players 1) *feel* the data, 2) *explore* the data, 3) *read* the data, and 4) *explain* the data [2] [22]. Figure 3.9 show these results, and while not remarkably clear, we can see how the game allowed players to explore, and most notably *feel* the data more than anything else. We hope that future work can expand on this type of analysis when looking at how video games can be used to communicate data. Regardless, this notion of “feeling” or emotional connection is what inspired the game’s development in the first game, so again we believe that these results show the success in creating empathy.

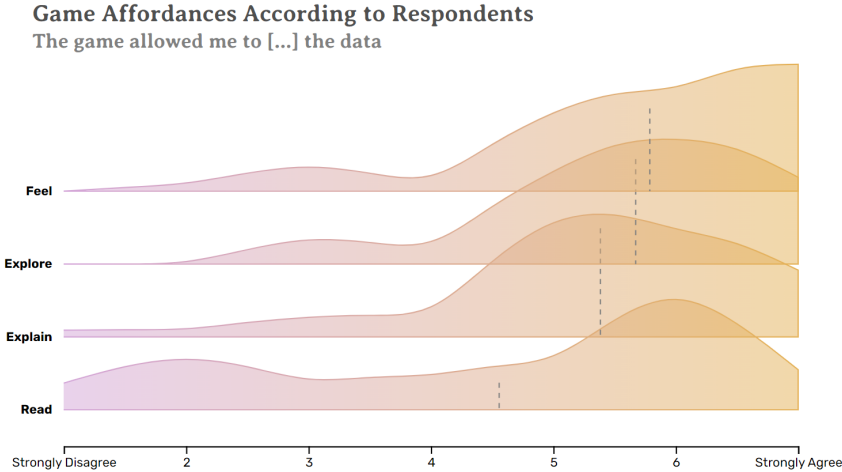


Figure 3.9: Distribution of responses towards how the affordances the game provided towards interacting with the data, inspired by William Allen’s data visualization typology. The mean response for each of the four categories is shown as a gray dashed line.

3.4 Changes in Understanding

Similar to the previous section, this section covers quantitative and qualitative evidence on the impact the game had, this time diving into the increases in *understanding* respondents had after playing the game. Recall from Section 1.1.3 that understanding is considered a crucial aspect of empathy and empathy generation, particularly from the perspective taking facet as well as through creating realistic scenarios that users may be familiar with.

Learned Something New
I learned something new about the migrant experience.

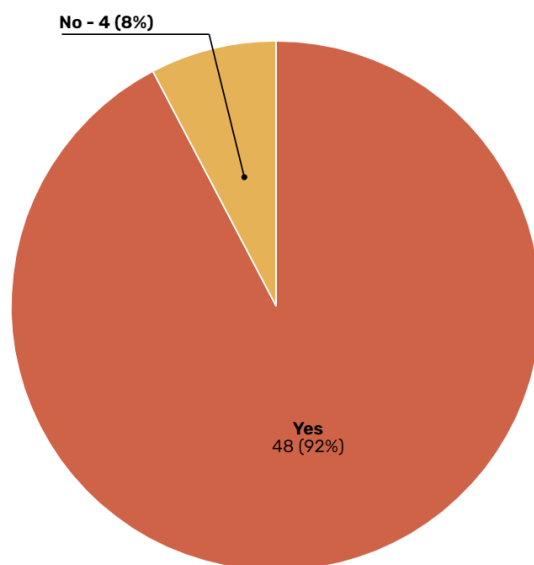


Figure 3.10: Pie chart showing how most respondents indicated that they learned something new about the migrant experience after playing *Vida Migrante*.

Overall, we saw a significant increase in understanding from before playing the game ($M = 0.82, SD = 0.09$) to after playing the game ($M = 0.90, SD = 0.07$), $t(51) = 6.9, p < 0.01$. This corresponds with a percent increase of **10.25%**. This increase was smaller than the increase in average empathy alone, possibly due to the factors we noted in the respondent demographics (Section 3.2) and the caveats (Section 3.1). As previously mentioned, initial understanding score was already extremely high at 0.82. This may explain the smaller increase, as there was not much room to grow in terms of understanding. Nevertheless, we still found a plethora of qualitative evidence from the respondents supporting the conclusion that understanding increased, and the fact that there was still a non-trivial increase in the normalized score is notable. Additionally, one of the questions we asked as a follow-up after playing the game was whether or not respondents felt like they learned something new. Figure 3.10 shows these results, with 48 respondents ($\approx 92\%$) saying that they did learn

something new. Although learning something new does not necessarily equate to understanding, it does give a glimpse into how respondents were able to make some meaningful takeaways from playing the game. We also asked an open-ended followup question on *what* respondents learned (Question 1 in Table 2.2), which is the source of a lot of our analysis into the understanding that was generated. The following subsections dive into four overarching categories in how understanding was achieved, which we derive from responses to this question and the overall sentiment observed from respondents. Note that this section is less substantive than the empathy results because our primary focus was on empathy.

3.4.1 Difficulty of the Migrant Experience

The primary area where respondents displayed an increase in understanding was in seeing how *difficult* the migrant experience is. As already explored in Section 3.3.3, it is clear that most respondents found the decisions they had to make as migrants rather difficult. However, this section explores the overall difficulty and struggles in the *situations* that were conveyed to respondents; respondents began to show signs of understanding that being a migrant trying to integrate into a new country is extraordinarily difficult, not only because of the decisions you have to make. Unfortunately it is a bit hard to see this result quantitatively due to the prior understanding respondents had; cognition question 1 for example (“Migrants may face many challenges...”) showed only a 3% increase, perhaps because the starting raw score was already 6.65 on a scale from 1 to 7. Fortunately, there is a substantial amount of qualitative evidence from quotes and open-ended responses.

As introduced in Section 3.4, we drew a lot of insights into how respondents gained understanding from one of the open-ended questions we asked, “If you felt like you learned something new, what was it?” Note that the responses we discuss here are related to the difficulty of the migrant experience, though there are many other responses related to themes described in the following subsections. One of the ways respondents recognized the difficulty of migrant experiences came in the form of seeing the large families that migrants had to take care of. One migrant profile in *Vida Migrante* in particular, Luis, was the head of a family of 6, which elicited a variety of reactions. Some respondents already had some sense of how difficult it might be to take care of a large family. During the migrant profile selection, a lot of respondents avoided Luis, saying things like “at first glance families are a bit harder [to take care of] so I probably wouldn’t choose a family” (16a), “probably will be a very hard game” (22a), “I don’t want to deal with kids” (23a), and “family of 6 sounds like a lot already” (45b). This may be attributed with the high levels of understanding people already had prior to playing the game, but it was clear that people were confirming their beliefs during the playthrough. Those that did not explicitly point this out from the start made mentions of it later when they played as a different profile. One respondent for example chose a different profile on their second attempt after playing as Luis, saying “[having a] family is hard” (28o), while others began to equate the larger families as harder “difficulty levels” (7b), saying things like “let’s try it on hard mode” (43e). This particular example shows the more light-hearted and approachable features a video game can afford to players because it is, in the end, just a game. However, given the data we have seen so far, the game is able to balance its “fun” qualities with the more serious subject matter and

message, which, importantly, may be difficult to achieve in any other form of educational medium. Going back to the reactions to a large family, it is clear that respondents gained some understanding that migrants may sometimes have large families, and taking care of them while trying to integrate into their new society is difficult.

Respondents also specifically cited how they learned about the difficulty of the migrant experience. Respondent 43 noted how they learned “just how difficult” the migrant experience is, adding “I thought it was hard but [it’s] REALLY hard.” Others mentioned how they “didn’t realize the extent to which poverty affected people and the difficulty migrants had” (Response 5), how the game gave them “a better understanding of how low migrant families’ income might be and how difficult it was to make choices” (Response 34), or how they were “unaware of how vastly difficult it is to manage the time and money resources when one is a migrant” (Response 7). Respondent 7’s response is quite notable because he also reported that he is a migrant himself, showing how even those supposedly already familiar with the situation can still gain understanding from a video game. Other responses show how the game helped players “learn about the different challenges that migrants face” (Response 35), provide them with a “broader perspective on how difficult it is to even get the wheels on the road” (Response 44), and even bring understanding to people who “underestimated the amount and kinds of challenges that migrants face” (Response 36). These examples and more show how there was a clear increase in understanding due to the video game itself.

3.4.2 Illusion of Choice

Another facet of the migrant experience that players gained understanding of was the *illusion of choice*. Because of limited resources, often times there is only one possible decision they can make. Most notably, respondents noticed how the challenges migrants face are often not their fault, but a structural failure of the environment they live in. This was quantitatively captured by cognition question 7, where there was a 15% increase in understanding that challenges are due to structural issues rather than personal issues, the second highest increase out of all cognition questions. As always, this numeric evidence is supported with quotes and open-ended responses. For example, respondents noted realizations of how “some of these choices aren’t even an option in real life” (Response 2), or “just how many things are out of a migrant’s control”/“migrants have no control over their situation” (Response 3, 14d), or “much of the time [migrants] don’t even have a real decision” (Response 10). Others specifically cited the “illusion of choice” (Response 12) and how they had to “pick between two bad options, which is quite disheartening” (Response 11), or that “neither option was a good option to pick, but there were no other choices to make” (Response 35). It is clear from the data and these quotes that the game was able to create understanding of the scenario because of the focus on interactivity and decision-making, which may be difficult to convey in a static, non-interactive medium. The fact that players learn this in real time *as they make the decisions themselves* is a really powerful way to generate empathy towards migrants. There is arguably no better way to *understand* what migrants go through than to experience it yourself, an experience this game hopes to provide.

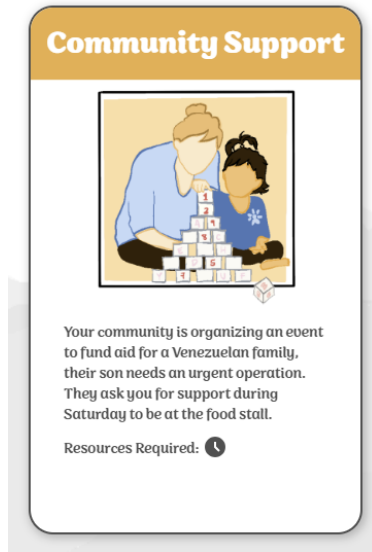
3.4.3 Tradeoffs in Decision-making

The third major insight that respondents gained understanding of was the concept of *tradeoffs* that migrants have to make during the decision-making process. One of the understanding goals we hoped to communicate with the game was the fact that migrants have to make a lot of sacrifices in order to survive in Ecuador. We believe the game was successful in doing so. Looking at the quantitative evidence, cognition question 3 directly asked whether or not respondents believed that migrants must make tradeoffs to cover their basic needs, in which there was an **11%** increase in such sentiment. Although the raw empathy score was already high at 6.09, this question saw one of the largest increases, jumping up to an average score of 6.76.

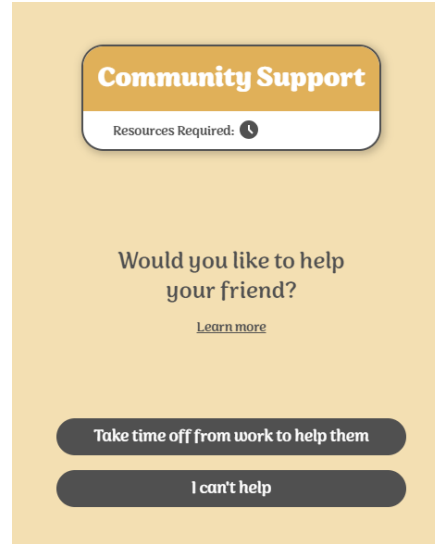
Qualitatively, we found that there were three main subcategories of tradeoffs players noticed and understood when playing the game. First, many noted how there were clear tradeoffs between long and short term decisions as migrants, which is exactly what we were trying to capture in the “assistances” described in Section 1.1.4. Many respondents caught on to this idea quickly, describing these assistances as “Immediate” versus “Long term” (41c) or “Short term needs versus long term needs” (42b). One approach we observed players taking was to pick assistances that benefited them in the long run, such as regularization and training, which were often picked if the migrant family they were playing as was small or did not have too many expenses. Many stated this explicitly, saying things like “In the long run [regularization] works out” (28c). Most others, having picked larger families with expenses higher than income, talked about how they needed to prioritize short-term needs. Phrases like “Training would be nice, but a family of 4 might require food or cash” (49a) and “Cash benefits me now, training benefits me in the long run” (14c) qualify this finding. One respondent even resonated with the frustration of having to put off long-term personal growth for short term needs, exclaiming “Ugh I keep putting this off” (16i) in reference to forgoing the training assistance.

Second, some respondents recognized and came to understand the trade-off between helping others and helping your own family. A common scenario for this was with the community support card (Figure 3.11), where players were asked to help members of the community, forcing them to take time off work. One respondent noted this, saying initially how they “want the family to be healthy” (16g), whereas later in the game when faced with this card, they acknowledged that “community is important” (16h). Another was more adamant about prioritizing their own family, saying “I would not” in reference to “helping someone to the detriment of my own family” (49b). Some respondents even explicitly wrote how they gained this level of understanding when asked what the game taught them, saying things like “I learned how difficult it is to balance what you want to do for others and what you want to do for yourself and family” (Response 17) and “Migrants had to give up their own time and resources in order to gain help and respect in return for the future” (Response 48). A similar situation occurred for the remittances card, where players were asked if they wanted to send money back to their family at home or not. One respondent even quoted the statistic within the game, exclaiming how “Only 13% don’t send remittances,” showing how they learned something new about these migrants and their actions (22b).

Lastly, when asked what they learned by playing the game, many respondents explicitly



(a) Community Support Card Description



(b) Community Support Card Options

Figure 3.11: The “Community Support” card where players have to decide whether to take time off to help the community or not. Respondents’ reactions to this card show how they empathize and understand the tradeoffs migrants must make, in this case between helping others and helping themselves.

acknowledged the concept of tradeoffs in decision-making. Respondent 30 wrote, “going through the simulation, my involvement in many of the difficult financial decisions taught me more about the trade offs that migrants have to make in order to put themselves in a better situation,” while others noted how they learned about “the need to balance between different options” (Response 32) and “the types of tradeoffs the migrants have to make on a daily basis” (Response 40). Tying this all back to empathy, Respondent 38 had a strong emotional response after playing through the game as a migrant, adding in their final response, “to see that the migrant experience is strongly focused on survival and trade-offs is heartbreaking.” These conclusions are quite powerful, showing how the act of making these decisions through the video game medium was a great way to build understanding of (and even empathy towards) the migrant experience.

3.4.4 Importance of Time and Resources

Related to the growth in understanding of tradeoffs was respondents noticing how important *time* is for migrants in Ecuador. Unlike other insights, we unfortunately were not able to capture much quantitative evidence of understanding for this finding, yet the quotes and responses still manage to paint a picture of how respondents gained understanding when it came to the importance of time for migrants. Overall, respondents noted how “everything requires time” (4c) and that there was “not enough time or money” (41c) to do the things they wanted to do.

Breaking this down even further, a lot of respondents were shocked at the number of

hours migrants may need to work. Players found themselves working 56, 60, and even up to 71 hours per week, noting that it is “a lot” (38b, 23c, 20d). Related to the insights into tradeoffs discussed in Section 3.4.3, respondents even learned how the large number of hours worked did not really let them do anything else outside of work, a reality for many migrants. Some respondents noticed this from the start during the migrant and occupation selection phases. For example, when picking a job for Génesis, one respondent noted how “she’s the only caretaker for her mother, so working too many hours might not be a good idea” (13c), ultimately influencing their decision for what job to select. Additionally, once they were working, respondents felt that they could not take any time off. One respondent noted “I’m the only one that can work” (49f) when deciding to borrow money for medicines, since they realized that if they became ill, the whole family would struggle since they are the only one providing for the family. Similarly, when faced with the community service card, another respondent quite bluntly stated “taking time off work is not a viable option” (14b).

As a result of these observations, some respondents even began to gain understanding that migrants cannot go through this experience on their own, and that they may need help. We asked respondents in cognition question 5 whether or not organizations should help migrants integrate into their new environment. Taking some of the burden off of migrants in this way could give them *time* to do other, perhaps more meaningful things with their lives such as personal growth and raising a family. We observed a 7% growth in average raw empathy and understanding towards this question, and again, while the increase might be small and the starting score was already quite high, we recognize the its value because of the qualitative evidence that supports it. For example, Respondent 15 was able to learn about the “assistance provided by the international organizations,” while Respondent 17 wrote how they “understand how [migration] is an important topic and that there is a lot of work that needs to be done to help migrants.” Sentiment that more work needs to be done by organizations to effectively help migrants was clear, demonstrated in responses like “I learned that the assistances can only be received a couple of [times] and they are usually not enough to make a huge impact on quality of life” (Response 33) and “I learned that public assistance, while they are there to help, are many times difficult to acquire for families” (Response 38). Overall we observed that people who may have previously not known about these organization-backed assistances learned about and *understood* them and made the connection that perhaps they can help migrants, which was one of the goals of *Vida Migrante*.

Chapter 4

Discussion and Conclusion

In this chapter we open up a discussion of the results and evaluate the *Vida Migrante*'s empathy-generating components, which we hope will help inspire future work on the study of empathy games.

4.1 Comparison to Other Studied Empathy Games

To preface this section, it is quite challenging to compare the results of this study with past work due to the open-ended nature of the study of empathy generation from video games. As discussed in Section 1.1.2, there is a vast variety of video games even within the empathy games genre, particularly since their goals and techniques can vary. *Vida Migrante*, for example, targets a broader topic of human migration in Ecuador, whereas other games may target more intimate and personal stories like in *That Dragon, Cancer*. The methods vary as well, while some video games are designed and developed to be extremely realistic, others are more simplistic and stylized. Most importantly, the methods of measuring empathy, as discussed in Section 1.2.2 can vary as well, so it is difficult to directly compare results from different studies with one another.

For example, in Greitemeyer et al.'s study, *Playing Prosocial Video Games Increases Empathy and Decreases Schadenfreude*, the authors reported an increase in empathy ($t(56) = 2.24$) and a decrease in schadenfreude ($t(56) = 2.06$) towards an incident that happened to a real person, which is less of an increase than our observations [18]. However, a comparison is invalid as the methods were quite different. In Greitemeyer's study, the game (a simple strategy game *Lemmings*) was used solely as a mechanism to generate *openness* to empathy for a completely different subject matter. Additionally, the comparisons were done between *Lemmings*, what they refer to as a "pro-social" video game, and *Lamers*, an "anti-social" video game. Our study instead focuses on the game itself to teach both empathy and understanding *directly for the concepts it presents*.

Chen et al.'s study on *That Dragon, Cancer* reflected our methods more closely, in that they conducted a pre and post survey and hoped to increase empathy directly through the game. Using their measurement methods as described in 1.2.2, Chen's study found that mean empathy increased by 7.9%, which is again less than our increase of 11.54% [9].

Unfortunately this comparison again does not hold too much meaning since our empathy questionnaire differed from the Jefferson Scale they used.

Given these less-than-ideal comparisons, our takeaway is that this study *strengthens* the argument that video games can in fact be used to generate empathy towards the topic of human migration, even if we cannot necessarily say that it is more effective than other games towards other topics. As we suggest in Section 4.3.1, future work may want to explore the idea of being able to compare the effectiveness of empathy games against each other.

4.2 Features of Video Games for Empathy Generation

This study additionally sought to explore what features of video games can generate empathy and understanding, since the use of video games for this goal is rather new. We hope that by sharing what worked well and also what *didn't* work as well, we may help guide future game development and research.

4.2.1 What Worked Well

The overall sentiment from respondents was that *Vida Migrante* did a great job overall at generating empathy and understanding as explained in detail in Sections 3.3 and 3.4. Several respondents noted how they “like the game” (8c) and the very “aesthetic” (26d) and “smooth” (33a) user interface. Aside from high level comments on the quality of the game, which help build engagement and interest in playing it in the first place, there were a couple of key features we noticed that really drive empathy generation. For example, the migrant and job selection sections we found to be incredibly effective. Numerous respondents noted how the game is “engaging” and “good at putting [them] in the shoes of someone specific” (18a) after going through those sections. The ability to choose the migrant profile even inspired almost all respondents to play the game again even after completing a playthrough. One respondent explicitly noted “I like the different options for choosing the character, especially if going through [the game] multiple times” (17b). It is clear from these responses that giving players the ability to customize their experience through a selection was an excellent way to not only increase engagement, but also increase empathy towards an experience as we saw in Section 3.3.1.

Outside of the initial customization of their profile and occupation, many respondents really engaged with the constant *interactivity* throughout the game, particularly in the decisions they had to make as evidenced in Sections 3.3.2 and 3.4.3. One strategy used throughout the game that was particularly effective was the use of directly “calling out” the users with the words “you” and “your” to accompany the context and decisions. For example, instead of saying “*Luis* is sick of a lung disease,” the game would say “*You* are sick of a lung disease.” This choice of second-person wording (which becomes first-person from the perspective of the player) really helped put people into the shoes of migrants. Additionally, because the decisions were crafted from real migrant data, this technique of allowing users to make decisions on behalf of the migrant they selected was an excellent way to build *understanding* as well. A lot of respondents noted how they learned a lot from the playthrough

of the migrant experience. One respondent said how they thought the game “did a great job teaching about these things” adding that they “didn’t know about a lot of the situations” (36i). On the empathy side, respondents really connected with the idea of using a game to generate empathy towards topics. One respondent told us, “I think [the game is] really good at teaching people empathy” (33f). Another told us “Overall, [we] don’t learn about personal stories” in the classes they were taking which mentioned migration, and “We should do this more, this is really cool” (37f). These quotes reveal how the personal touch of *Vida Migrante* both in the migrant selection and decision making guided by the player was not only incredibly useful for creating empathy towards serious topics, but also for keeping the experience “cool,” “fun,” and engaging.

Another feature of *Vida Migrante* that worked well for the understanding goal was the constant detail and context provided in modals, background sections, “learn more” links, and data-supported evidence throughout the game itself. Respondent 7 for example shared that “all the statistics about the percent of migrants that face certain issues were completely new to me,” and others had a similar sentiment, particularly when looking at the context in the landing page (Figure A.3). Respondents were also more likely to read through these details if they already had to interact closely with the website we presented to them, because their actions mattered. For example, players would see a dialog with statistics on the migrants when clicking on the options when making decisions. If a player was thinking of not sending remittances, the game would provide the statistic that only 13% of migrants don’t send remittances to Venezuela (Figure A.2). Though it was not explicitly studied, we believe that if the same information was provided in a static, non-interactive design, it would not have been communicated as effectively to users. The way the content was worded was important as well, as some respondents pointed out to us. Migration can be a really somber topic, and it can be hard to create an effective medium that engages users with a very serious topic. We had to strike a balance between the game being engaging and “fun,” yet also being able to communicate the rather serious situation these migrants are in, such as how many migrants spend most of their income on basic needs. One respondent pointed this out, saying “I like the wording” of the details provided when the game was over. They mentioned how “it is ‘firm,’ but says everything that needs to be said” (44e). These features along with a pleasant, clean UI as respondents mentioned, allowed players to make insightful takeaways about human migration after playing the game.

4.2.2 What Didn’t Work Well

Unfortunately there were some aspects that did not work as well as we had initially hoped as some respondents pointed out, most of which stem from the fact that the game was quite simple. For example, the dashboard (shown in Figure 1.3b), which we hoped would bring more interactivity into the game, was rarely used, particularly since budgeting expenses had not been implemented. This missing feature was brought up numerous times during the study, as many people hoped for a more in-depth, realistic experience. One respondent told us how there were “definitely a lot of things I was thinking about, but weren’t really captured in the game” (16k), while another mentioned how they felt that it was a bit “too simple” and how “these issues are a bit more nuanced than the game presents it” (Response 46).

Similarly, another respondent noted how the game felt “superficial” because of the limited choices for migrant profiles and decisions for each card (Response 26). As discussed in the following section, we hope that future work can take note of these drawbacks in order to create more effective empathy games.

4.3 Future Work

Our discussion of future work is broken down into two components. First, we discuss improvements to current methods of studying empathy games, although we also discuss things that worked well in this particular study that may be useful for future studies. Second, we introduce new potential topics that could be interesting to look at within the study of empathy games.

4.3.1 Improvements to Current Research

We hope that future work can take the successes and failures from this study and incorporate them into new studies on different empathy games. First, future iterations of this study may involve adjusting the empathy score questionnaire and calculations to minimize leading questions such that starting empathy and understanding is not high. As shown in Figure 3.6, there is a noticeable missing range in starting empathy that would be interesting to capture. Regardless, our study supports the consensus in existing research that Likert-style questions are particularly effective at capturing empathy, despite potential biases in the questions. These questions strike a good balance between providing *flexibility* in a user’s response and providing a *constrained*, ordinal value from such response. Likert-style questions avoid the decision between a binary “yes” and “no” when it comes to having empathy, which allows respondents to freely answer without fear of judgement, particularly if they do not feel completely empathetic towards a subject matter. On the other hand, these questions avoid the pitfalls of completely open-ended questions because their numeric responses can be easily compared against each other across the set of respondents. Additionally, we also found that the effectiveness of the open-ended questions and qualitative analysis could not be overstated. Notably lacking in past research, a qualitative analysis revealed the nuances of empathy generation that are difficult to capture from a purely quantitative analysis of the Likert-style responses. For example, cognition question 8 revealed that players became more upset with the migrant experiences and their hardships, showing increased empathy, but the quotes and open-ended responses shone a light on *how* and *why* they became more upset. Section 3.3.3 shares some of these quotes and findings for this particular example. Further research may think about if there is a way to standardize the way we quantify empathy generation *specifically when it comes to video games*, particularly for cross-comparison of multiple empathy games. On the other hand, research could discover that empathy generation and the way we study it is all situation based. Additionally, for games like *Vida Migrante* that use real data, we may seek to find the best ways to test whether or not that data was conveyed in a way that also creates empathy and understanding. Of course, making sure that the games are polished is also essential to keeping the game compelling and effective at achieving its goals.

Aside from the flaws in our question design, there was also a considerable gap in the respondent demographics as acknowledged in Section 3.1 which perhaps led to the empty range of low starting empathy. Our study targeted educated youth, but it would be important to also test games like these with a more diverse population. For example, *Vida Migrante* in particular focused on a humanitarian issue, where it is common for projects to target government and NGO leaders such as politicians, donors, and activists to spur policy change. Additionally, the age range in our study was similarly quite limited within the younger demographic, which may contribute to the biases in this study. For example, older politicians may react extremely differently to a game like this than college-aged students, so we hope that future work can explore a broader target audience.

4.3.2 Additional Topics Within the Study of Empathy Games

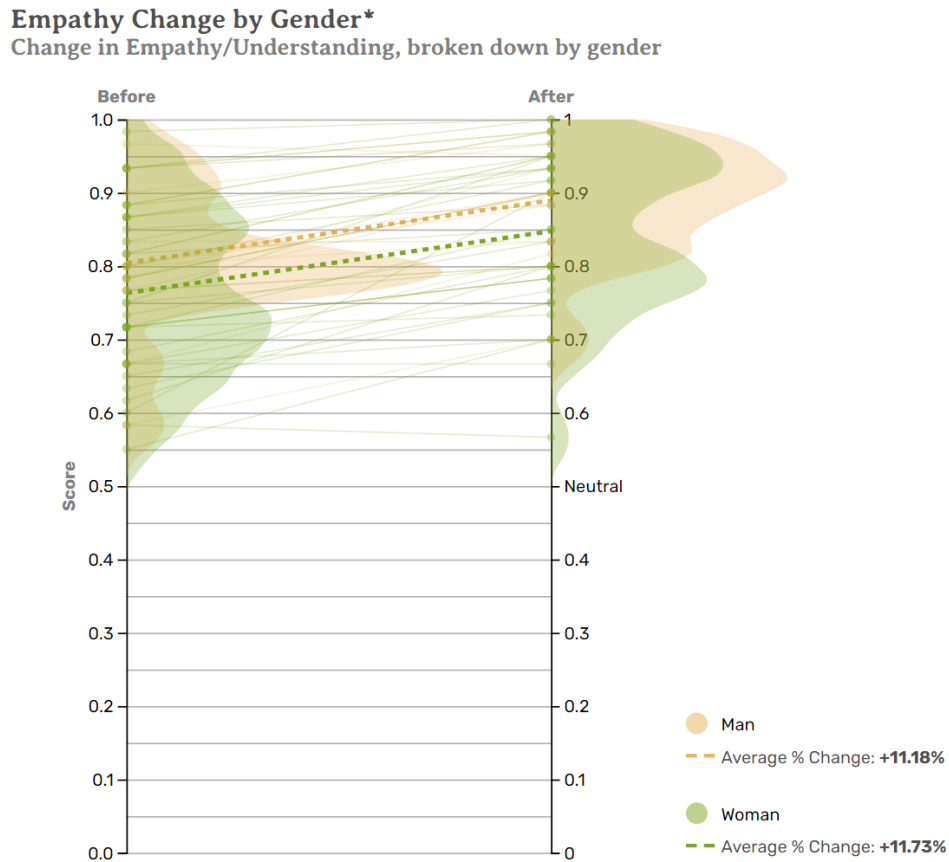


Figure 4.1: Summary of starting and ending empathy *and* understanding across all respondents, broken down by self-identified gender. * Omits 2 responses, one is non-binary/non-conforming, the other did not self-identify.

For inspiration on what to explore in the future, we can look at past work related to empathy not necessarily in the context of video games. First, previous work on the study of empathy also has raised the question of whether or not there are differences in the ability

to feel empathy between men and women. The general notion that women are superior at empathizing with certain topics has been both supported and challenged, so it could be interesting to look at how this notion holds up when it comes to empathy generation from video games [31]. A cursory analysis of our data, shown in Figure 4.1, reveals very little difference in empathy generation between men and women after playing this particular game. If anything, we observe that men actually had slightly higher starting and ending empathy than women on average. On a similar note, more than twice as many women than men signed up to take our survey on a video game even with the equal representation among our target population. This finding is interesting because it also challenges the general trend (which is often stereotyped) that men play video games far more than women do [19]. The clash between the notions of women being superior at empathy and men being more involved in video games within the study of empathy games could be rather compelling and fascinating to look at.

Another question future work can ask, since it is becoming more and more clear that video games are an effective tool for teaching empathy, is how we can we incorporate them into society. As shown in past work, this is already being tested within medical schools and practices. However, can this use of video games be expanded to any educational services, or even contexts outside of education? *Vida Migrante* for example is designed ultimately to encourage policy change, so future work may explore how video games can be used to influence policy-makers in their decisions across all sectors. This question again relates to one of the caveats in our study where all of the respondents already had some form of empathy towards migration. Future work may seek to understand how empathy games can influence people that may be opponents of the goals or messages they are trying to convey, particularly among older generations that might have strong preconceived opinions on particular topics. Similarly, we hope that future research could explore additional contexts for the games themselves (as well as additional, perhaps more complex datasets if the game is data-oriented like *Vida Migrante*), touching on more humanitarian issues that require empathy such as racial justice, housing, equity, and more.

4.4 Conclusion

This study shows that the empathy game *Vida Migrante* is effective at generating empathy and understanding towards the topic of human migration in Ecuador. On a quantitative and qualitative level, respondents indicated that they were able to better empathize with the migrant experience and understand the decisions migrants have to go through on a daily basis to survive in their new home. Furthermore, this research contributes additional evidence to the existing literature that video games can in fact be an extremely effective tool for empathy generation, even being able to communicate real data in a highly engaging manner. The interactivity video games provide is indispensable for putting players into the shoes of different people going through different scenarios and allows them to learn things from a simulated first-hand experience. We hope that this work inspires future empathy games to be created for many different topics within and outside of the humanitarian field to help people empathize with important issues in a fast-paced, technology driven world.

Appendix A

Vida Migrante Screenshots



Figure A.1: *Vida Migrante* landing page. The website can be found at <https://vidamigrante.migration.mit.edu>.

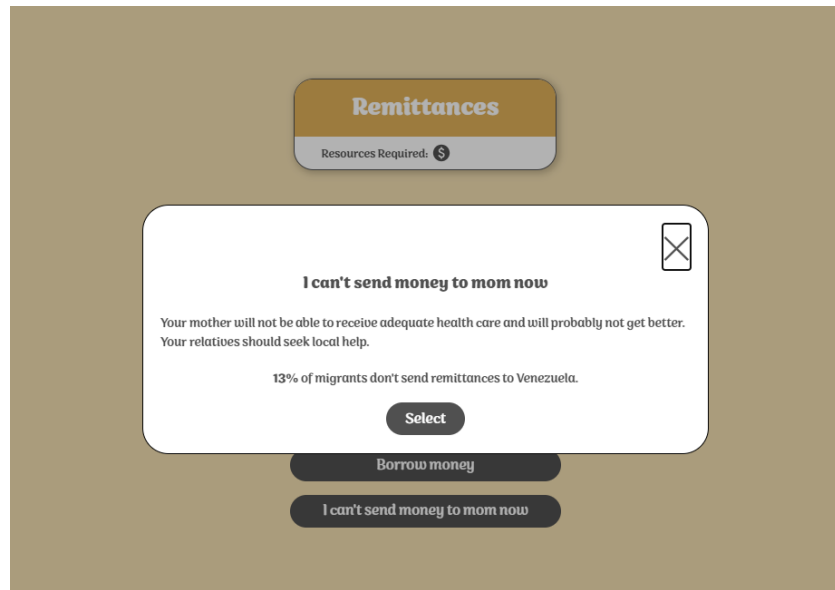


Figure A.2: Decision option modal. Every decision comes with additional details and context based on the real migrant data. This helps with fostering understanding towards the topic of migration.



Figure A.3: Landing page details. The landing page contains background information and context that is helpful for increasing user understanding of the topic. For example, numerous respondents were shocked to learn that "Over half of the migrants spent more than 90 percent of their monthly income on basic necessities."

Appendix B

Code Listing

Listing B.1: Raw Empathy Score Calculation Function (E_{raw})

```
1 def compute_raw_empathy_score(row: pd.Series, cognition_questions:
  list[dict]):
2     """Calculates the raw empathy score from the respondent data.
3
4     Takes in a row from the dataframe representing an individual
      respondent's answers and the array of cognition questions to
      look at. Adds the final "raw_empathy" as a new column in the
      row.
5     """
6     raw_score = 0
7     # Iterate through questions and the respondent's answers
8     for question, question_score in zip(cognition_questions, row):
9         question_score = int(question_score)
10        # Add scores from positive questions
11        if question["question"]["positive"]:
12            raw_score += question_score
13        # Subtract scores from negatives questions
14        else:
15            raw_score -= question_score
16    row["raw_empathy"] = raw_score
17    return row
```

Listing B.2: Empathy Score Normalization Function (for E calculation)

```

1 def empathy_normalizer(cognition_questions: list[dict]):
2     """Creates an empathy score normalizer function.
3
4     Takes in a raw empathy score given by summing the provided
5     cognition question scores and outputs a normalized score
6     between 0 and 1.
7     """
8
9     # Calculate the minimum and maximum raw empathy scores given the
10    # cognition questions
11    min_empathy_score = sum(
12        [
13            MIN_EMPATHY_SCORE if q["question"]["positive"] else -
14            MAX_EMPATHY_SCORE
15        ]
16        for q in cognition_questions
17    )
18    max_empathy_score = sum(
19        [
20            MAX_EMPATHY_SCORE if q["question"]["positive"] else -
21            MIN_EMPATHY_SCORE
22        ]
23        for q in cognition_questions
24    )
25
26    # Calculates the raw range and the normalized range for
27    # normalization
28    raw_range = max_empathy_score - min_empathy_score
29    # 1 # 0
30    normalized_range = MAX_NORMALIZED_SCORE - MIN_NORMALIZED_SCORE
31
32    # Create the actual normalizer function
33    def normalize(score: int) -> float:
34        return (
35            ((score - min_empathy_score) * normalized_range) /
36            raw_range
37        ) + MIN_NORMALIZED_SCORE
38
39    return normalize

```

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