Abstract
Vitamin Detroit is a PC game developed to address the issue of food deserts located within the city of Detroit and how it may pose problems specifically to children. The issue of food deserts ties into numerous factors such as location, social injustice and most importantly the lack of healthy, nutritious food outlets within the city. The main goal of the game is to educate children (Ages 5-17) and bring to them more awareness of the issues that may surround them all while promoting a healthy lifestyle for them.

Author Keywords
Nutrition; ESRB; Food Deserts; Food Justice; PC; Minigames

ACM Classification Keywords
K.4.2, J.4, I.6

Introduction
Food deserts are geographic areas where a resident’s access to affordable and healthy food options is restricted or nonexistent because of a lack of grocery stores within convenient travelling distance. These areas are often found in minority communities and are subjected to severely limited choices by the options available to them and what they can afford. Those living in food deserts may also find it difficult to locate foods that are both appropriate to culture as well as diet. These communities mainly suffer from an overabundance of fast food chains selling cheap “meat” and dairy-based foods that are high in fat, sugar, and salt. These communities also suffer from an overabundance of processed foods, such as snack
cakes, chips and soda, sold in corner delis, convenience stores, and liquor stores all around the area. However, our federal government doesn’t see a difference between nutritionally stocked stores and these junk food havens. The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy [1]. According to the NAICS’s code, small corner grocery stores are statistically lumped together with supermarkets. In other words, a community with no supermarket and two corner grocery stores that offer liquor and food would be counted as having two retail food outlets, even though the food offered may be extremely limited and consist mainly of junk food. This lack of definition leads to a lack of awareness in the U.S. and even in the communities suffering from food deserts. Our solution is to teach children and people of all ages how to maintain a healthy diet in a food desert, and why it’s important to do so.

**Food Deserts**
The central theme behind creating Vitamin Detroit centers around the issues of food justice and food deserts.

Cassidy R. Hayes and Elena T. Carbone introduce food justice as an encompassing “vision of social, environmental, and economic justice; improved nutrition and health; and community activism” [2]. The concept of food justice is meant to address “the disproportionate burden of environmental barriers to healthy food experienced by low-income communities and communities of color” [2]. Hayes and Carbone come to address alternative food movements that try to make food sources closer to consumers; environmental justice that focuses to reduce harm in the environment and remedy the lack of resources for a given demographic; food security that aims to provide enough nutritious food for all people at all times; and health equity and disparity which recognizes the need to level out the social factors that are connected to the issues. Food justice is more often than not “associated with public health, agricultural civil rights, and environmental efforts” [2]. In relation to Detroit, food deserts as a concept of social justice can be applicable when looking at the statistics from research articles centering around Detroit.

Alongside Hayes and Carbone, Dorceta E. Taylor and Kerry J. Ard authored an article on Detroit’s food justice and food systems where research looked more into Detroit. In the article, the authors evaluate food accessibility in Detroit focusing on these three questions for their research [3]:

- What kinds of food outlets are available to residents of the city?
- What is the nature of the Detroit food environment and how does it vary by the racial composition and population of neighborhoods?
- How do citizen-driven initiatives shape the food landscape?

According to Taylor and Ard, 36% of Detroit’s food outlets are restaurants and other food services [3]. Full-service restaurants makeup half of the total while 30% are fast food restaurants and the remaining consisting of “bars, clubs, caterers, and coffee or other beverage shops” [3]. Following the 36% of Detroit’s food outlets is the 32% which consists of small groceries and convenience stores [3]. Already these two categories of outlets makeup a large chunk of Detroit’s food outlets while supermarkets and large grocery stores are the smallest percentage.
Another important component that Taylor and Ard take into account is what these outlets actually sell to fully determine whether or not these outlets are unhealthy [3].

In relation to their second question, Taylor and Ard discuss how the food environments differ throughout neighborhoods based on racial composition. Since Detroit is considered to have a black majority population, Taylor and Ard note the ratio between the black population to the number of food sources. They demonstrate through a chart the ratios between the black populations and the number of food outlets. Based on their chart and research, they found that “neighborhoods with the lowest percentage of blacks tend to have a more favorable ratio of people to food sources compared to neighborhoods with a high percentage of black residents” [3]. This variance by racial compositions may tie in with Detroit’s history of racial residential segregation. Despite the disparities, this
leads into the question of what civilians are doing about the food landscape. Ultimately, the community must take on the initiative to bring up urban agriculture. School gardens, community gardens, and farmers markets add onto the contribution of urban agriculture in an attempt to shape Detroit’s food landscape into a better one. There is a community effort to improve the food landscape and this may be beneficial depending on how well the community effort develops in the future. In turn, this could also affect public health when it comes to growing food and providing healthier outlet options for Detroit’s areas that are in need of it.

**Nutrition**

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**Table 1**: This table shows the daily dietary needs of children 9 to 18 in terms of calories, specific food categories such as fruits and vegetables, and protein intake.

Nutrition is the key to our project. We wanted to focus primarily on the right amounts of protein, vitamin C and calcium. These are only just the beginning of a long list of nutrients and vitamins that children need to lead a healthy lifestyle. We also touched briefly on the myriad of problems that can come with lack of or an insubstantial amount of these vitamins and nutrients, two of the biggest issues is childhood obesity and on the other side of the scale, malnourishment.

The chart provided shows the recommended amounts of the three most important nutrients that children need during the different stages of their lives [5]. We decided to focus the age range of this chart between 9 and 18, from elementary school to the end of high school [6]. That way everything fits together as far as developmental age and the age that we set for the video game.

**Food Deserts Here and Now**

Most of Detroit’s residents live in a fresh food desert. In his book, The Urban Food Revolution, Peter Ladner says, “Roughly about half the population (of Detroit) has to travel twice as far to reach the closest mainstream grocer as they do to reach the closest “fringe food” location - a fast-food restaurant or a convenience store of the type that features alcohol, cigarettes, lottery tickets, snacks and a few tired fresh fruits and vegetables” [7].

With ‘fringe food’ locations being easier for residents to access, it’s not hard to see why Detroiter suffer from health risks. When the cheapest and closest option is often high in fat, sugar, and salt, residents of a fresh food desert are subjected to a greater risk of developing obesity. Obesity can lead to serious, even fatal health disorders if left unchecked, while also influencing mental and emotional problems [8]. Not only are Detroiter at risk of over consuming unhealthy foods, but they also suffer from not having enough access to feasible, nutritional foods. A lack of nutrients can jeopardize the proper development of a person and can cause negative health problems in the future [8].
**Our Solution: Vitamin Detroit**

The solution we propose is not guaranteed to resolve the entirety of food deserts. It is a partial solution which is meant to pursue the goal of educating children about nutrition and to promote healthier eating habits. This especially applies to children who live within the food deserts and have little to no control over which foods are available in stores.

Vitamin Detroit is a video game meant to promote healthier eating habits with the intention that, after playing, children could have better judgment with regards to the foods available within their space. Also, we hope that children may be more involved in discussing health with their parents and share the game with others of their age or older. The game is not only meant to be educational, but also engaging and exciting all while encompassing simplistic yet impacting story elements that relate to the injustices associated with food systems.

Food and nutrition will be the vital components of the game as the players will take on the role of the main character to traverse through varying levels of Detroit to both sustain their health all while preparing for the big birthday that is meant to be the reward of the game. Part of the nutritional aspect will not only involve collecting food items, but also imaginative battles with food items and minigames exploring essential vitamins and minerals crucial for the average healthy child. With this game, the aim is to educate children through an engaging experience all while promoting healthy lifestyles and making them more curious of their environment and its own food accessibilities.

**Game Design**

In order to create a game both fun and accessible to children five years old and up while also maintaining strong educational elements, a look into educational game design was necessary. For this, three articles were used in conjunction with one another. Mark Wolf's 1997 article "Inventing Space: Toward a Taxonomy of On and Off-Screen Space in Video Games," Sol Klapztein and Carla Cipolla's 2016 article "From Game Design to Service Design: A Framework to Gameify Services," and Michele D. Dickey's 2006 article "Game Design Narrative for Learning: Appropriating Adventure Game Design Narrative Devices and Techniques for the Design of Interactive Learning Environments."

Within a game, there must be physical limits to what the player can see and where the player can access. What the game's map holds within not only effects the physical limitations of the player, but also the emotional response the player may have, as well as the narrative of the game itself [9]. By setting Vitamin Detroit within the confines of not just the city of Detroit, but one small section of the city, the player is presented with a more personal view of the struggle to find and afford healthy food. A highly limited map in-game is more easily able to stimulate sympathy within the player, as the limitations of space effect the player's experience in every single way. Wolf writes on how space within games can create thoughts and feelings within a player that are then taking out and away from the game itself. In Vitamin Detroit these thoughts and feelings aim to educate the player and stimulate the desire for positive change in relation to access to good food within Detroit itself.
Klapztein and Cipolla turn their focus more on how interacting with video games may change interaction away from the screen and how this change may alter how services across many disciplines are provided. Games have the incredible power to captivate a player for extended periods of time and leave them with skills and knowledge that they may not have had before [10]. Playing games may create muscle memory or dynamic problem solving skills. Most importantly, people like to play games. Games are, first and foremost, made as a form of entertainment. A video game that is not fun, or at least mentally stimulating in some way, is a game that will never be played. Because of this, educational games create a vastly different setting in which to learn new skills. For example, websites like EdHeads offer short, often free-to-play games that teach players about a specific trade. EdHeads is a website meant for children grades 2 to 12 (about ages 7 to 18). This website contains many games specifically for different grade blocks, and has been popular with grade school children for over ten years. Interestingly enough these games are predominantly focused on the medical field. Recommended for grades 7 to 12 (about ages 12 to 18) is a game called “Virtual Hip Resurfacing” in which the player clicks buttons and answers questions in order to resurface the hip of a 55 year old patient. It is games like these which Klapztein and Cipolla view as the future of the training and service industries. Fun to play, accessible from a young age, and hyper-focused on education.

It is not only the educational goal of a game that is important, however. Dickey, rather than turning to the form or function of video games and their educational abilities, looks to the power of the narrative. For Dickey, the educational power of a game comes from its ability to captivate the player in characters and story [11]. The more immersed a player is, the more they relate to or even despise characters within the game, the more information the player will take out of the game and into the real world. A player can interact with a game absent of narrative, but will ultimately come away with vague ideas of the facts presented therein. If, however, a game is moving and emotional, the player will more readily retain and share the presented information. Furthermore, the player will encourage others to play the game as well [11]. It is because of this that Vitamin Detroit is not a game which only consists of food labels and mathematics, but also a story grounded in reality and character. This combination of fact and fiction will more easily help the player to remember and care about the problems presented within.

**Target Audience**

In holding to the ESRB’s (Entertainment Software Rating Board) traditional ratings, the game would then be “Rated E” meaning it is generally suitable for all ages, including children [12]. Children are the main focus as this game is meant to educate them and promote to them a healthier lifestyle. This is done through allowing them to understand the importance of nutrition as well as encourage them to learn more about the food environments around them regardless if they live within Detroit or not. However, despite the target audience being children, this does not mean that teenagers and adults may not find this enjoyable.
“Rated E” simply means the content is meant to be appropriate for all be they children, teenagers, or adults.

**Vitamin Detroit: Plot**

The story of Vitamin Detroit revolves around a child (the gender of this child is left ambiguous in order to make sure that the player can more easily see themselves as the protagonist) who wishes to make a healthy meal for a party. The game begins with the birthday of the playable character. The player is then given money from their grandmother as a birthday present and is then able to explore the surrounding area in search of ingredients to make food for the partygoers. The player is given access to a small map containing several places in which to buy food. However, not every store carries healthy items, and the player may have to travel farther into the map in order to obtain healthy ingredients.

The game takes place over the course of a week. Every day the player must eat enough healthy food containing the randomly assigned vitamin or mineral to pass the minimum requirement. If the player is able to eat enough healthy food, they may proceed to the next day, as well as grow a little taller. If the player is not able to meet the day’s goal, they must begin the day over. Each day the player must not only eat enough healthy food, but also find an ingredient needed for the party at the end of the week. Travelling across the map takes time, however, the foods that the player can eat over the course of the day may provide special power ups that may help, or hurt, the player on their journey to gather ingredients. The player must balance money, healthy eating, ingredient finding, and time in order to make it to the next day. Because the player grows taller after every day from eating healthy food, not only does the player gain access to more space within every store, but the player’s grandmother, thinking that the playable character is now older, replenishes the money spent the previous day.

If the player is able to find enough healthy food, and all the ingredients needed, then at the end of the week, they are rewarded with an end of game birthday celebration, as well as access to harder levels of difficulty as an optional new game mode.
Game Mechanics

The levels of this game are the days leading up to the feast. A level is completed when the player survives and collects all necessary ingredients for that day. The player can check on their daily progress in "Grandma's Special Food Book," which contains two lists that change every day. One list is of required ingredients for that day, while the other tells the player what nutrients they need to eat in order to survive.

Each day, the character’s health bar starts out at zero. The ‘Nutrient List’ in “Grandma’s Book” tells the player what they need to eat in order to fill their health bar. However, the list only tells the player what they need in order to gain health, and not what’s bad for them to eat. For example, the ‘Nutrient List’ would say x number of calcium is needed for that day. The player could eat candy bars and get the amount of calcium needed, but will discover the negative effects that come along with that decision.
The health effects of a poor diet are represented in the game’s “Impairments.” Impairments happen when the player has a negative reaction to unhealthy eating or lacking in necessary nutrients causing setbacks within the player’s game mechanics. For example, if the player eats too much sugar, they will get a ‘Sugar Rush’ where they will have a double speed boost for two minutes followed by a double speed drop for five minutes after or until cured by eating healthier food. It’s important for the character to eat their daily vitamins, because if they don’t, they’ll eventually become “Brain Dead.” Brain Dead is an Impairment that will cause some words on food products to be too blurry to read.

The player must learn how to read the food products in order to survive this game. Knowing the nutrition facts of a food product is vital to your character’s survival. If the player makes it through the day, then the next one will begin with the character waking up and being a little taller. The player will now have access to more foods and game content. Your Grandma sees that you’ve grown and thinks a whole year has passed and it’s your birthday again. She gives you more money for your ‘new’ birthday but she says, “I can’t figure out what I did with my Special Food Book I was going to give you. I must’ve forgotten…”

**Accessibility (System Requirements) and Limitations**

Because Vitamin Detroit is a computer game, access to a working computer, as well the enough access that a player may either save their game on it, or be able to be use it for a prolonged period of time is a requirement. For example, players may be able to access this game at home, school, or a library. Fortunately, Vitamin Detroit does not require a connection to the internet, therefore if a user has access to a computer, but no access to wifi or other internet connections, the user will still be able to interact with this game.

Vitamin Detroit will intentionally have a very low-resolution art style, meaning that the game will not be complicated to run, and that many older model computers (those without good graphics cards, or those without a great deal of disk space) will still be able to run the game. This is done to ensure that the player base of the game is not limited to those who have enough money to afford the newest or most expensive computers.

Players must be able to perform simple math and forward thinking in order to complete Vitamin Detroit, as it is a strategy-based game. Players must also be able to read, as labels for food items as well as goals and power-ups will be presented as core gameplay elements. This game will launch in English, but it will be possible to translate it into other languages with more time. However, this does mean that, at least for the initial launch of the game, the player must be able to speak English.

**Long-Term Goals**

There are numerous future goals we aim to make a reality. These goals involve mainly improving Vitamin Detroit in order to make it more engaging, accessible and beneficial when it comes to learning.

To make it more engaging, we hope to add additional content that players can download for free. One main
addition to the base content can be the different difficulty settings that users can play the game on. Difficulty settings would include the “Easy”, “Normal”, and “Hard” modes. However, “Normal” and “Hard” would possess a twist where the main character may have a health condition such as diabetes or celiac disease. This new gameplay element forces the player to understand the consequences of poor food choice as well as fundamentally limited food choice. A second main addition to the base content is multiplayer mode where users can play with family and friends. They will be able to learn with each other as they compete. A major game component that we would want to develop in the future is an urban farming and gardening feature to provide more ways to complete objectives.

Aside from content, another goal is to import the game into a mobile device and other game consoles to make it more accessible. New languages will be included as a future goal as Detroit itself has different ethnic groups who are bilingual or even may be still learning the English language. A final main goal is to get involved with communities within Detroit who are taking the initiative to improve Detroit’s food system. If children are involved or families with children, we can provide entertainment through the game all while making it a learning experience. We would hope, if by then we installed the urban farming feature, interest to participate in these agricultural communities would grow.

**Conclusion**

Our goal was to build a video game that would help educate children on nutrition and help promote healthier eating habits. In educating children, the intent is that they would be able to make better decisions in food choice regardless if they are within a small convenience store or gas station. In addition, children would hopefully share the game and discuss its contents with parents and others so that the conscious decision making would be more relevant. Vitamin Detroit is a mix of fun gameplay mechanics with helpful content in understanding nutrition, health risks and benefits, and understanding the food landscape of Detroit through the in-game map. It is not a perfect solution that will lessen the entire issue of food deserts, but it is a small solution that aims to help those living within the deserts understand their food options and make the best choices possible when knowing the potential health risks of malnutrition.

**References**

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