

# User Interface (UI) Design as A Visual Communication Medium for Composting Waste Management Education

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## ABSTRACT

As the fourth leading country with the largest population, the demand for needs in Indonesia has increased significantly, especially in primary needs such as food and household materials. With the massive amount of waste and lack of awareness, the waste we produce is thrown away to the landfill, without knowing the effects it might cause. In this situation, there are many people throwing garbage in the wrong place. The awareness amongst youth in Indonesia in regard to excessive waste and composting as a solution to act on it is, still low. In the effort of collecting data, literature studies from different sources are used, this research also conducts in-depth interviews with experts in the field. A creative solution of creating a digital platform in the form of a website that called Feed the Soil is made to help raise the awareness to solve the problem. With an attractive visual and interactive activity, it would be easier for the targeted audience to be able to increase their interest and boost their knowledge. As a result, the awareness is raised, and information can be easily understood and received in a fun and unordinary way. Moreover, further research is still needed to provide more depth to the platform and implementation.

**Keywords:** visual communication, website, composting, waste management, education

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## INTRODUCTION

Indonesia came in second place as the country with the most wasted food in the world after Saudi Arabia (Economist & Unit, 2016). The fourth leading country with the largest population, the demand for needs in Indonesia has increased significantly, especially in primary needs such as food and household materials. In estimation, each citizen wastes roughly 300 kg of food waste per year (Iswara, 2020). Landfills in Indonesia no longer have their full capacity. In 2018, the available capacity of controlled landfills has decreased by 56%, from 55% in 2016 to 44% (Jakarta, 2019). 60% of the landfills in Indonesia are filled with organic waste (Kehutanan, 2021). It is such as waste because organic waste such as food waste, leaves, and other biological matter can degrade and compost themselves naturally in the right condition. Unfortunately, landfills are not one of them (Victoria, 2016). In order to overcome these problems, a solution of recycling organic waste to reduce the amount of waste in landfills is present, known as composting. A study done by Brown about an environmental and forest sciences researcher associate professor at the University of Washington, stated that composting food waste and organic waste remains the best way to reduce and recycle waste in landfills (Brown, 2016).

Composting is a natural process of recycling small recyclable and organic matter into a healthy fertilizer that enriches soils and plants (Hu, 2020). Through composting, a healthier compost, as a result, is known to be an alternative to synthetic fertilizers, as it is more sustainable and better for the earth. Composting is a part of an integrated solution to waste management strategy rather than a one-time thing (Ayilara et al., 2020). Although it seems like a lot of work, composting has become one of the most versatile and accessible ways to degrade recyclable waste. Many benefits could get from composting, such as reduce waste, enriches the health of soil, and reduce greenhouse gas emissions, carbon footprints from landfills, and reduce the use of synthetic fertilizers. The good benefits of composting should be announced to the public as an actor of changes. Even though there are lots of advantages composting has to offer, there are numerous reasons why this alternative is not yet implemented more often. According to

Ayilara, emphasizes the possible challenges that could be faced along the way. The most common challenges include inconvenience such as producing unwanted odors or attracting rodents, long duration of the process, cost, space required. However, each of these challenges can be resolved with extra attention and effort.

Fox et al, conducted research on the correlation of high education levels towards their knowledge on food waste in 4 different countries, Indonesia, Taiwan, Greece, and Denmark. The research concluded a positive correlation is found among most respondents despite their countries. It is stated that the majority have great common knowledge and concerns regarding food waste. However, respondents from Indonesia, Greece, and Denmark lack knowledge when it comes to their role in the response to the excessive food waste that existed. The majority of the students from the three countries need more awareness on taking action to tackle food waste (Fox et al., 2018). From these existing journals, it can be concluded that a strong desire and awareness are still needed to move people to act in tackling this global issue through composting as a sustainable alternative.

Furthermore, this paper aims to create a concept for the UI (User Interface) design as a communication medium for millennial; mostly Gen-Z (1997-2015) and late millennials (1966-1990); about environment sustainability that focus on composting. Website is one of interactive social media that can spread the information widely (Ariel & Avidar, 2015). Web design is a term in the system that focuses on the appearance of the website without eliminating the main functions of the website. It provides information to the readers or website (Singh & Singh, 2018). One of website function is giving information that can be education medium to learn something (Efriana, 2021). Design is the central part of the website, by understanding the principles of design (contrast, emphasis, balance, unity, and rhythm) and the elements of design (shapes, colour, texture, lines, and direction). Commonly, each website is dedicated to one specific topic and/or purpose. For example, a website can be used for educational purposes, commercials, or networking (McNeil, 2012). All these fundamentals are combined to create a website that achieves individual or company goals to communicate to audience.

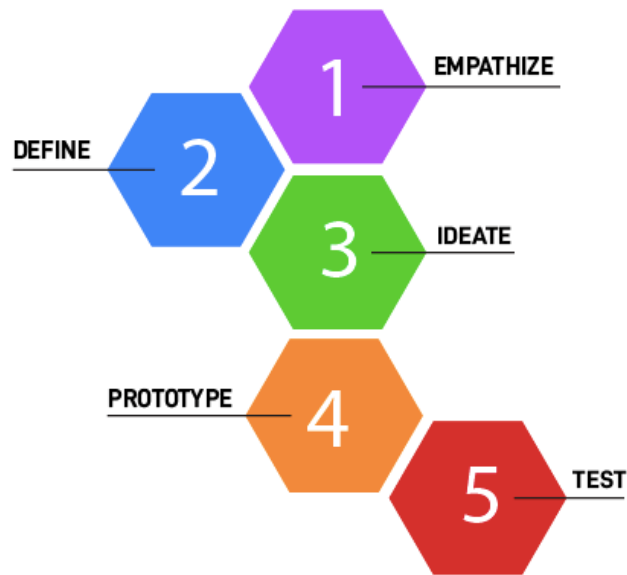
These are some of the design trends the researcher aims to implement as a creative solution to reach the objective set. These trends are expected to help researchers catch the targeted audience's attention by using designs that are currently in demand. Other than design trends, researchers aim to create a solution that creates interaction between the medium and audience. An interactive activity of gamification on the website can be done to give a new, fun, and exciting way of learning to the targeted audience. Gamification is a rising trend that applies the concept of gaming mechanics to help motivate, engage, and enhance user experiences. The impact of gamification on learning and instruction has a positive outcome on one's learning process (Yamani, 2021). It is stated that *"...the use of game-based elements could increase students' motivation and engagement, enhance academic performance, promote interaction and socialization, and provide opportunities to develop autonomous learning skills."*

## **METHODS**

The literature study method is used to collect all the information that needs to be delivered to the targeted audience. A reliable source is used in this stage of research to avoid misunderstanding and misinformation. Information is gathered from various media such as journals from university research, governmental organizations such as Sistem Informasi Pengelolaan Sampah Nasional (SIPSN), non-governmental organizations (NGOs) such as waste4change, sustentation, credible online articles, and publication. A book entitled "Mengompos di Rumah itu Mudah" by DK Wardhani is also used for this study to enrich the researcher's knowledge.

As for the qualitative method, the interview had been done with experts in eco-living and advocating environmental issues to Gen-Z. The interview will be conducted virtually through WhatsApp/Zoom. In order to gain deeper insight, the researcher decided to have a one-on-one conversation with Esta Wantah, an eco-living enthusiast. She uses her Instagram page as a platform to raise awareness about sustainable waste management. The researcher decided to bring up the topic of composting because the researcher was inspired by Esta's posts about her composting journey. She has been implementing sustainable waste management in the comfort of her home for a year now, and her experience with composting is expected to give light to this research.

In the effort of understanding the market, I had the interview Nala Amirah, she is a co-founder of one of Indonesia's leading Non-Governmental Organizations (NGO), Green Welfare. Established in 2020, Green Welfare is an NGO that focuses on agriculture with the mission to achieve zero hunger, food security, and sustainable agriculture. This interview aims to understand methods of engaging with the target audience in the effort of raising awareness regarding organic waste and composting. The interview is expected to give the information needed to gain the targeted audience's attention. This paper adapted a Design Thinking method combination of IDEO and Stanford d.school in creating a concept for UI (User Interface) design for Feed the Soil. It started with Empathize and Interpretation to design UI by using the local wisdom [17] that reflect the Feed the Soil, followed up with an Ideation and Experimentation. It ended with a Test to evolve the design to the next step (Figure 2).



**Figure 1.** Design thinking stages.

Design Thinking is a design methodology that provides a solution-based approach to solving problems (Pressman, 2019). This is especially useful for tackling complex problems that are unclear or unknown by understanding the needs of the people involved. Reframe problems in a human-centered way, generate lots of ideas in brainstorming sessions, and adopt a hands-on approach to prototyping and testing.

Empathize is the needs and insights collected from empathy. Learn from the phenomenon that happened, study about the target audience by doing observation, interviews, try to understand them and never judgmental them. In this research, youth Indonesian generation that lives with digital platform is the target audience. As a nation's next generation, they are the person that going and develop the country, deal with the problems, and find the solutions. Interpretation is creating a point of view based on the user needs and insight. Interpreting the meaning of a work, peeling the technique to express the designer's wishes in the work. In this stage, designer decided to create an information and interactive medium based on digital platform that easy to learn and understand about waste management by youth generation.

Ideation means brainstorming with as many as possible and generating ideas for possible solutions. People shares the idea, then diverge or converge the design possibility. In this study, the visual idea started from style, form, colors, and layout. Prototype or mockup is a part of creating the ideas to be real by conducting experimentations through design and principles element in design development. The architecture and visual design have been done as a prototype of website. The last step is a testing the product (website) to target audience. Ask some target audience to look the website, then see whether they like the appearance, ask if the design (typography, colors, images, and layout) works well for them. And, to know if the website structure easy to use.

## RESULTS

### Interview

The purpose of this study is to create an education, interactive, and attractive digital platform based (website) about composting as a visual communication media for sustainable way of waste management. To gain deeper insight, the researcher decided to have a one-on-one conversation with 2 participants virtually through Zoom. According interviewed to Esta Wantah, an eco-living enthusiast, composting is one of sustainable way to waste management. To raise awareness young generation today, digital platform is very helpful to create sunrise in the world. Start from small thing but has a good impact. the lack of awareness surrounding food waste and its effect and how it is mostly overshadowed by more common environmental issues of plastic, transportation, fast fashion, and such. When the problem of food waste should also be on top of mind when talking about environmental issues.

While as for Nala Amirah, as the Co-Founder of Green Welfare, they maximize and optimize the digital era by creating a digital media platform to create a buzz regarding the rising environmental issue of sustainable agriculture. They use different platforms such as websites, and Instagram to achieve their objective of raising awareness. Therefore, the first realistic step that can be taken is to give more awareness to society about the problem, the effect, and the solution with a strong, fun, and consistent attractive design.

Both interviewees said that creating a digital media platform to create a buzz regarding the rising environmental issue of sustainable agriculture. The digital platform must be designed wisely in communication visually. Exploring different visual elements such as illustration, typography, colors, the layout is highly encouraged but make sure to keep a consistency in style mainly colors to give a sense of belonging. Keeping things straightforward is also necessary especially when working with digitized media because audiences' attention span can be a bit tight when dealing with social media.

### Visual Solution

The visual communication part started from define by creating some mood board to get the feel and atmosphere of the object character. The mood board can use as a guide for graphic designer as a basic thinking (Cassidy, 2011). Basically, a collage used in the design industry to convey the project to potential investors or even to get the designer's ideas organized. The website will be mostly earthy-muted tones, such as family of brown, off white, touch of orange, green, and light grey to make sure that it will not hurt the user's eyes while scrolling but with a little touch of bold color here and there, to attract their attention and give more emphasis. It will also maximize the usage of simplified illustration to help the audience understand better the topic brought. Based on the data research and mood board, then designer started to do some sketches (Figure 2).



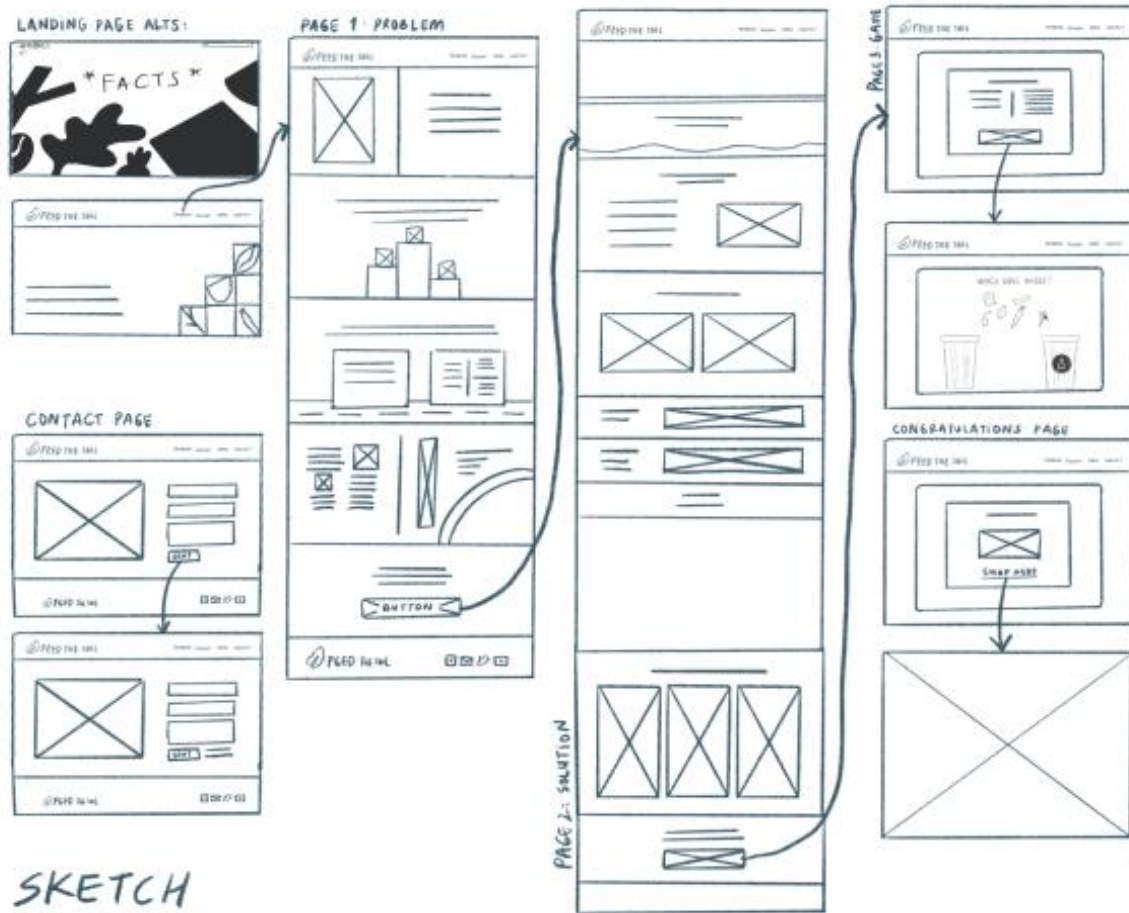


Figure 2. Mood board and sketch of Feed of the Soil.

The mood board curated to create the mood of the final creative solution that give a natural look and give comfortable feeling. The website will be mostly earthy-muted tones, to make sure that it will not hurt the user's eyes while scrolling but with a little touch of bold color here and there, to attract their attention and give more emphasis. Earthy-muted tone come from natural things around and containing some brown, these palettes create a warm, nature-friendly atmosphere (Swasty & Adriyanto, 2017). It will also maximize the usage of simplified illustration to help the audience understand better the topic brought. The simple illustrations dominate the pages, to focus the information that delivered.

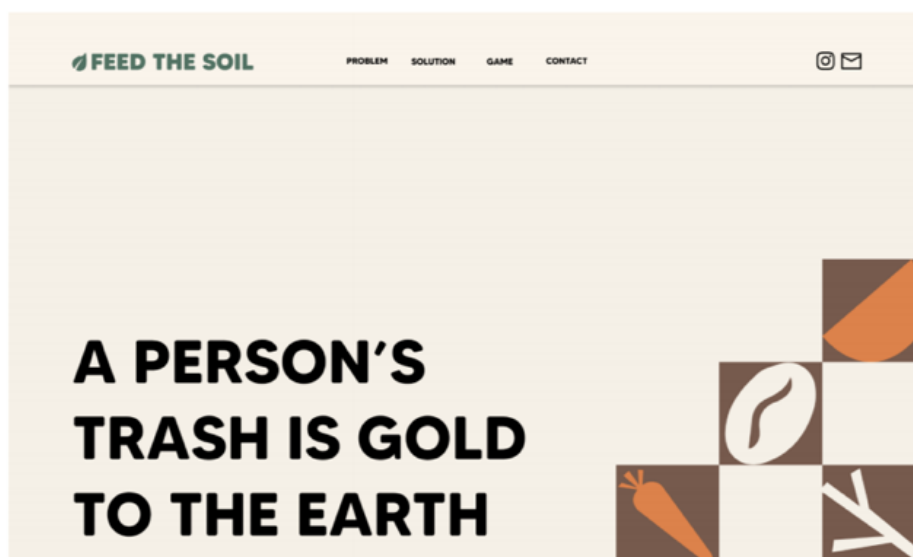
The initial sketches made regarding incorporating website and graphic elements. Above is attached also the wireframe sketch of the website flow. The flow is made to create a dynamic and great flow. The flow is firstly for the user to understand the problem, next is the solution, and to top it off, a little fun game slash quiz to test the audience's understanding and awareness.

For the website itself, the designer decided to name it "Feed of the Soil". The designer thinks that the name can represent the concept of composting and could also give a sense of curiosity to the public. The logo came up from leaf. The logo is a bitten leaf. It was inspired by a leaf that the soil grew, and the bitten part was inspired by a bitten apple, to represent the problem of food waste that needs more attention right now. The leaf is more dynamic, and the bitten part feels more natural. While as for the typeface chosen, to give a sense of organic, dynamic, and friendly that is why the designer decided to go with a rounded typeface called "MADE Tommy Soft" to create the dynamic character. The main color will be dark green to give a sense of environmentally friendly. Although, it is versatile depending on the needs. By seeing the logo, people get that natural, friendly, and dynamic character.



**Figure 3.** The Logo for Feed the Soil.

First and foremost, the navigation is a crucial part of a website since it helps the user to navigate all the contents and pages available (McNeil, 2012). The navigation bar includes the website logo, problem, solution, game, and contact. Completed with Instagram and email icon for direct contact for the users to contact the developer. By clicking each of the buttons it will directly lead them to the pages they want to go to (except for the Instagram and email because we didn't make one yet for the prototype) (DeWitt, 2010). The first page started with the landing page. For the landing page, the designer decided to go with a catchphrase that is simple enough to attract the user's attention and curiosity, complimented with several simplified illustrations of waste such as branches, fruit scraps, carrot, and coffee bean to represent the organic waste, the main star of the topic brought (Figure 4).



**Figure 4.** Landing and Navigation Page.

The page then continued to shift direction to the problems discussed. The problem discussed is made to look like an upside-down triangle where the first discussion would be a general topic and as the user scroll the problem discussed will be more focused, detailed, and thorough. To introduce the problem, first, the designer shows the general information about waste in Indonesia specifically about the amount of waste produced annually in Indonesia, alongside a simple illustration to complete the look (Figure 5). The purpose of using a big font size in simple sanserif to give a bold information that this is the matter of problems.



Figure 5. Page 1, Section 2: Problem: Indonesia's Waste Production.

As the user scroll, the information will continue with the top three waste components that can be found in Indonesia. To deliver a fun and attractive design, the designer decided to portray it as if each waste is standing on a winning podium, with the highest podium the first place, second place in a mid-height podium, and third in the shortest podium. To complete the feel of the winning podium, the designer decided to insert a GIF of a confetti movement at the back of the food waste as the number one waste component found in Indonesia (Figure 6).



Figure 6. Page 1, Section 3: Problem: Indonesia's Waste Components

Next, the designer continues to explain waste management and landfill capacity. A similar approach is done like the previous page. This page uses an illustration of a truck that usually picks up waste on the way to a landfill. The content is put inside the illustration to make both, the copy and illustration, the center of attention. Completed with signs to emphasize stopping the trucks from coming and from wasting waste. A graphic element of moving image (GIF) is used on the road part to make it as if it was moving (Figure 7).



Figure 7. Page 1, Section 4: Problem: Indonesia's Waste Management & Capacity

Last, is the tip of the iceberg, the main problem of excessive waste in landfills. The designer decided to make good use of grids to create a nice flow for the users to read. The first grid explains how organic waste the highest number is of waste found in landfills. Continued with how organic waste could degrade itself in the right condition and how landfills are not one of them. Next, the 2nd column explains why organic waste should not be in landfills and the effect it can cause. A further explanation of the effect is then done on the rest of the page, complete with simplified illustrations (Figure 8).

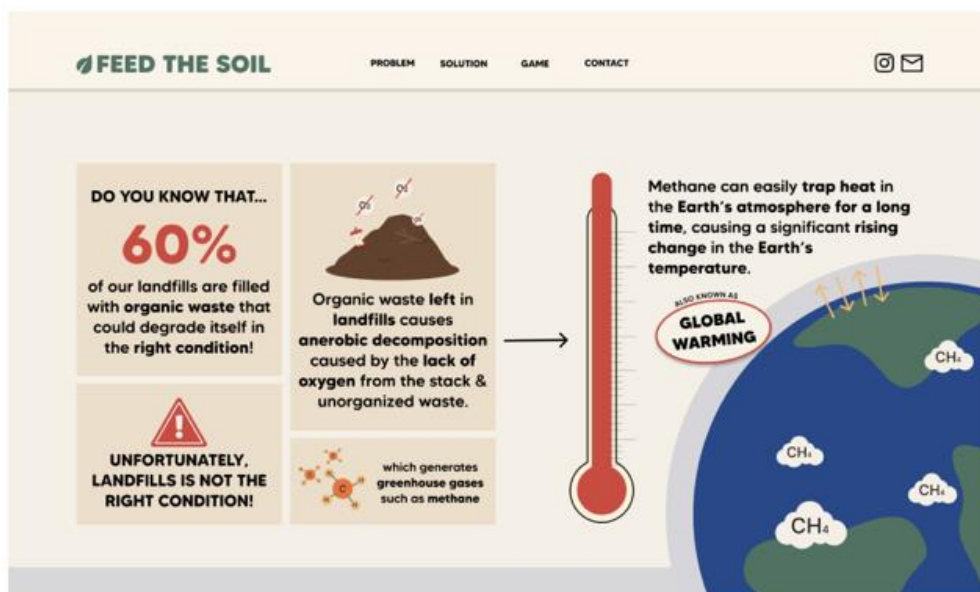


Figure 8. Page 1, Section 5: Problem: Effect of Organic Waste Left in Landfills

At the very bottom of the first page, the user can find a bridging section that will help them get interested and directed to the second page. The copywriting is made as if the user was having a real conversation so that the users would not get bored reading and consuming the information. Below users can also find a footer with more of the organization's social media and an offer to join a community to keep the users informed (but no prototype is made for the footer) (Figure 9).





Figure 9. Page 1, Section 6: Problem: Bridging and Footer

The first nine figures, that contain problem of waste, was designed in light earthy colors to present a natural and environment looks. To build the clean and nature character, using light color with contrast object's colors create the information or text easy to read. Using the same illustration style and color creates the syntactic information that they are in the same area or level.

The second page is the solution page. The solution page is made to inform the users on how to act upon the problem, through home-composting. The page will be a scrollable page, the concept is to layer the land and soil. So, the page started off with a navigation bar as always, a headline, and a definition. It is then completed with an illustration of a land (a home and garden) and below it, you could already see the soil (Figure 10). As the user scrolls, the information will continue with how composting works. The background color gets a bit darker to show depth and dynamics about the soils. It is also completed with a little illustration of the waste, microbes, and a little texture to top it off (Figure 11).



Figure 10. Page 2, Section 2: Solution: Home Compositing & Definition



Figure 11. Page 2, Section 2: Solution: How It Works

Thirdly, shows the information on what type of waste can be composted in home-composting (Figure 12). In this page, the designer really maximizes the use of illustration to inform the users. To make sure it is clear enough, the designer also added some text to inform what types of waste to be able to do composting and the nutrient each waste brings to the composting process. This section is made a bit bigger because the designer wanted the users to really focus and absorb the crucial information. Fourthly, the users can see and understand what type of waste cannot be compost and the tools and materials needed to compost (Figure 13). It has a similar treatment to the previous one, as the designer maximizes the use of illustration in this section. To top the section off, the designer decided to add a little twist such as a conversation-like phrase to indicate that the users are moving forward to learn how to start composting.



Figure 12. Page 2, Section 3: Solution: What Can Be Composted?

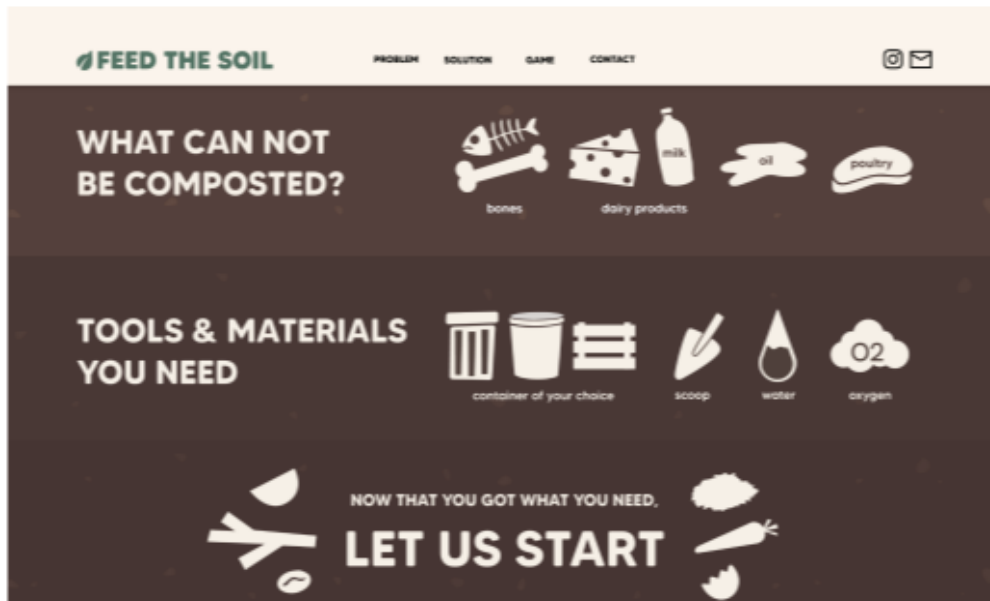


Figure 13. Page 2, Section 4: Solution: Tools, Material, and Bridging

Next is the how-to compost section. In this section, the designer informs the users about how to start home-composting. Using boxes and grids to separate each step, every step is completed with a concise and straightforward description. For the users to absorb the information, a visual narrative of illustration is used to illustrate each step. To top it off, the designer also put a small tip using different elements and colors so that the user's attention can be easily grabbed and are able to navigate it clearly. An overlay of dots that resemble soil texture is used to fill the negative space in this section (Figure 14).



Figure 14. Page 2, Section 5: Solution: How to Compost, Step by Step

Second to last, is a section to inform the common challenges found in composting based on the designer's research and ways to overcome the challenges. This section is pretty heavy in illustration in order to help the users get a visualization of the problems they might encounter and how to solve them when they face them. It is self-explanatory and straightforward so that the users are able to grab the information directly (Figure 15).



Figure 15. Page 2, Section 6: Solution: Common Challenges and How Overcome It

In second six figures that contain solution by doing composting were designed by using brown gradation colors to communicate that the composting is related to the ground. By using a high contrast color (white and dark brown), all the important information can be delivered clearly.

Lastly, to finish up the second page, another bridging section is made to help direct the users through a conversation-like bridging. The bridging is made in the hope to attract people to continue and check the website thoroughly. A simple illustration of soil, plant, and waste is used to help the users refresh their memories for the quiz/game. The button will direct the users to the game page and of course, a footer below, to complete the web feel and help the users engage (Figure 16).



Figure 16. Page 2, Section 7: Solution: Bridging and Footer

The last main page and the main feature of the website, the game slash quiz page. The page is pretty much self-explanatory. The users will be greeted with a box that includes the title of the game “Which goes where?”, the objectives of the game, the instruction, and a hint of reward the users will get after

completing the game. To continue, the users need to press the start button and it will directly direct them right to the game. The game does not have any time limit since the objective is for the users to really understand and reabsorb the information from the previous page but in a more fun and exciting way just like what researchers in the literature review have stated, how gamification has helped strengthen memory and understanding (Figure 17).



**Figure 17.** Page 3, Section 1: Game: How to Play

To play the game, the user just needs to select and drag the waste illustration provided to the right bin! There are 2 different bins, first is a compostable bin with a recycle symbol on the bin and the second is a non-compostable bin. If they drag the waste to the right bin, the waste will be able to shrink in size and directly go inside the bin! (Figure 18).





**Figure 18.** Page 3, Section 2: Game: Playing Game

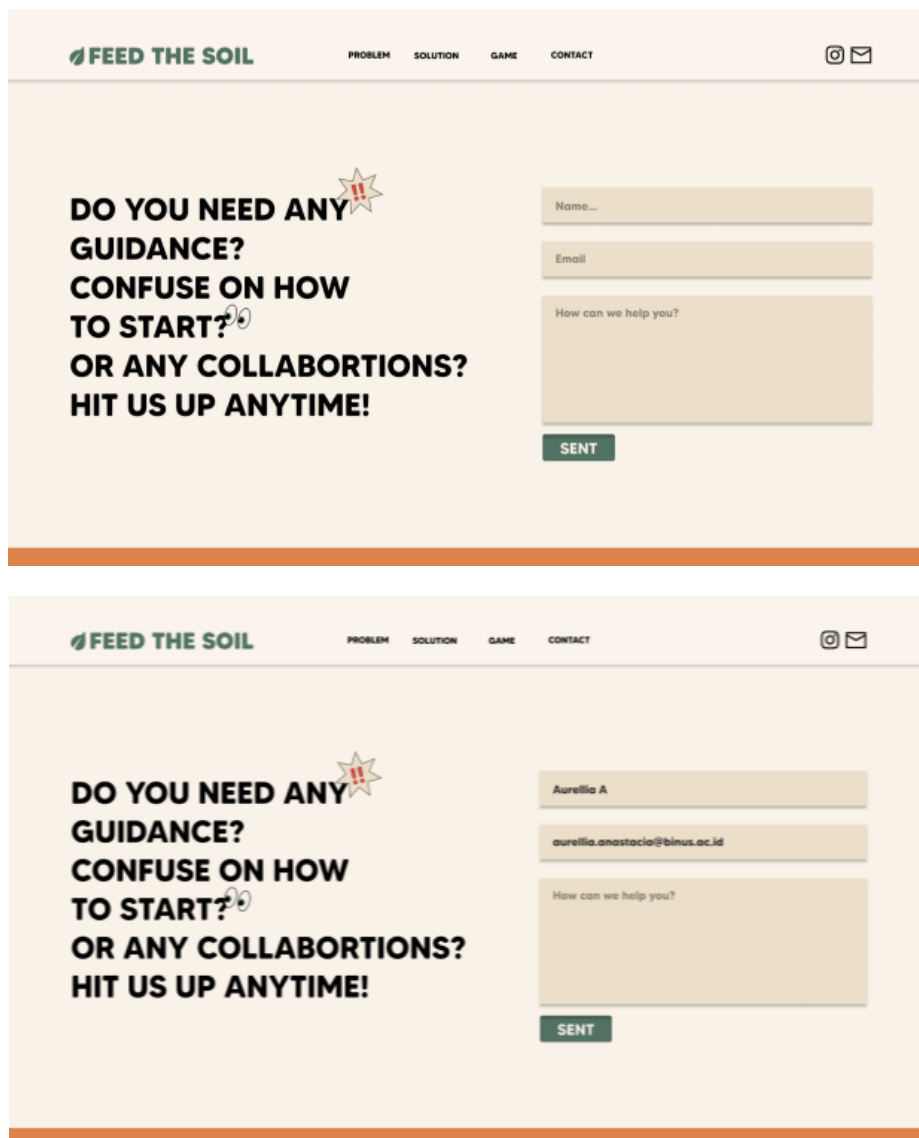
Once it is all done right, they will be directed to a congratulation and reward page. Since the targeted audience is mostly generation Z and late millennials, the designer thought that it would be fun to put some cultural references to create relevancy and appeal to the audiences. The designer decided to use a GIF of a clip from one of the most well-known Korean dramas, which is Hospital Playlist. The GIF represents a feeling of satisfaction and winning. Alongside the GIF, congratulation wishes with a fun, approachable copywriting, and reward is present. The imaginary reward users can get after winning the game is a 10% voucher discount in a sustainable store that agrees to partner up with Feed the Soil. An underlined button is provided to help the users to be directed directly to the shop for easy access (Figure 19).



**Figure 19.** Page 3, Section 2: Game: Reward Page

The game section gives a happy and cheers-up feeling by using orange color. The interactive pages created engagement between user and the content. This website had been tested to five participants in 17-22 years old. Most of them know what is composting but do not understand how to do it. After saw, learnt, and played through the Feel the Soil website, they said that composting seems easy and some of them can remember step by step to do composting. Using not too much color makes the message

delivered fast and easy to understand. The animation and game gave another impact to them, they were looking forward to more animations and gameplay to more fun and memorable. Lastly, an additional page is made to complete the website feel is the contact page. The contact page is there to create a synergic interaction between the users and the organization. The contact page includes some directions the user can ask or suggest to the organization. To contact the organization, the user simply needs to write their name, email, and the question and/or suggestion they want to suggest and from there the users can send the message to the HQ email and a reply mail will be sent in 24 hours working time. The page is also completed with the same navigation bar and footer from the other to give a sense of consistency and belonging as one whole website (Figure 20).



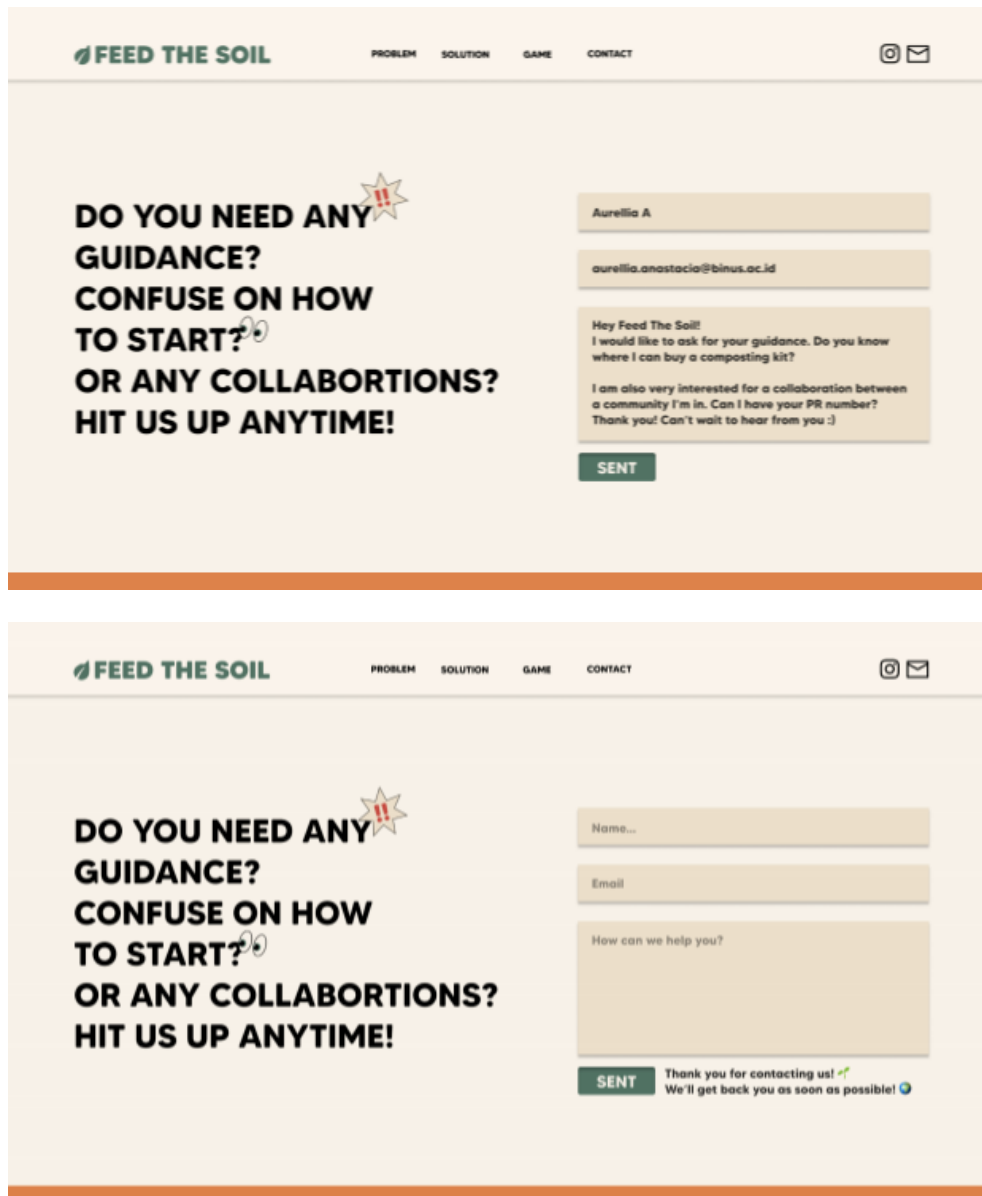


Figure 20. Page 4, Section 1: Contact Page

## CONCLUSION

There is still a lack of knowledge and understanding towards the environmental issue of food waste and composting. Which is why a buzz of raising awareness and quick action is needed to prevent more excessive food waste from harming our environment. It cannot be denied that a systematic change could help turn the table around, but without the small steps of educating oneself and being aware, systematic changes cannot be completed. That is why our steps and actions are very much needed to go to a bigger change. In effort of these small changes, it can be started by providing a platform where people can find all the information needed and wrap it in an attractive and interactive way to spark more interest amongst society, especially youth. One of the platforms that can be used in this digitalized era is a website. Websites are accessible, and versatile in terms of design and experience, which can help advocates and designers to explore a more creative approach to raise awareness, for people to learn and engage more in this issue.

Creating a website platform like “Feed the Soil” above, is one of the many ways people could take advantage of the convenience digital media could offer. Although a mix of illustrated website and



gamification can give a better understanding in terms of receiving messages, there is still a lot of room for improvement. For instance, there can be more games such as a game to differentiate the greens and browns components or mix and match the problems and solutions that can be faced during composting. Using a simple shape and typography, play with size of fonts, and minimum colors, can give more impact for user. Nevertheless, this was only the start. The author and designers would recommend using digital platforms and creative design to raise awareness about food waste in the future. However, further research and design is much needed to run a smoother change.

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