AN APPROACH TO DESIGN A STIMULATING RESTAURANT ENVIRONMENT

AND EXPERIENCE THAT INFORMS AND INSPIRES ITS PATRONS ABOUT

NATURE, THE ENVIRONMENT, AND SUSTAINABILITY

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THESIS ABSTRACT

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In today's society, there is a lack of environmental knowledge and a lack of environmental stewardship. Studies conducted by the National Environmental Education & Training Foundation (NEETF) have proven that these two concerns are actually very related and have the same solution: Education. Environmental education directly correlates with recycling, saving power, and other pro-environment actions. But where can people get this knowledge and be sure that it is correct? The NEETF found that more than half of Americans are influenced by incorrect or outdated information.

Research shows the media is the "leading source of environmental information for adults" (NEETF 15). But how much of that information is non-biased and totally trustworthy? The solution is a new means of environmental and green information.

According to *Restaurant.org*, on a typical day in 2007, restaurant sales reached $1.5 billion. This statistic is enough to show that restaurants are here to stay and people will continue to go to them to eat, drink, and socialize, but what about to learn? According to the website *Statcan.ca*, the average person spends 1.6 hours per day in restaurants. How much of that time is downtime, waiting for a table or for food, that could be spent obtaining new knowledge and finding out inspiring statistics?

This study involves creating an approach to design an eco-friendly restaurant that demonstrates green practices, instructs about nature and the environment, and uses renewable resources. Inside this environment, every patron who visits will be influenced somehow. Through environment planning, experience design written literature, visual stimuli, and interaction, this approach will help restaurateurs instill entertaining, intriguing, and rewarding information in every person that wines, dines, and socializes inside. In addition, people will be involved, to an extent, with the entire green experience.

Studies conducted by the NEETF and others have proven the theory that information plus knowledge equals positive change. To make a difference in the world, the spread of knowledge is the key, not just for a healthier earth, but also a healthier society. In conclusion, the goal of the approach is to design a green restaurant experience to build an appreciation of nature through education, and to inevitably create a new found respect for the environment.

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CHAPTER 1: INTRODUCTION TO PROBLEM

1.1 Problem Statement

There is an enormous lack of environmental knowledge and stewardship in the United States. Americans are either misinformed by the media or word of mouth, or are ignorant to environmental knowledge in general. Currently there are not many social places that American citizens can go to be informed about the environment. Because of this epidemic, the natural world is suffering. If there were social hot spots, such as restaurants, that people could go to enjoy themselves and take in valuable information, the world's grave situation could be improved. It has been proven that knowledge is directly linked to active and positive environmental involvement. If this green restaurant showed the benefits of organic foods, sustainable materials, and eco-friendly systems, as well as an abundance of other facts and figures, people would not have to step out of their regular routine to gain this much needed knowledge.

1.2 Need for Study

"About 80% of Americans are heavily influenced by incorrect or outdated environmental myths" (NEETF). Through surveys it was "discovered that the public fails to understand the basic principles underlying many of the major environmental subjects discussed in the media" and that "Americans have low levels of knowledge on basic environmental facts" (NEETF 3). This percentage is shockingly high and directly

impacts the negative things affecting our world. It has been proven that people with environmental knowledge or who are environmentally literate are more likely to do daily activities that benefit the natural world. According to the National Environmental Education & Training Foundation (NEETF), "environmental education can guide the public to simple actions that could save at least $75 billion annually."

"If we are ever to get real control of environmental problems in the U.S. and abroad, we will need a public with a sound base of education, able to understand these problems and address them at their source" (NEETF). To accomplish this, there needs to be new ways of getting information out to the public that will actually be acknowledged, understood, and also entertaining. By "greening" a common aspect of the American culture, the restaurant, the public can educate themselves while they wait, dine, and relax. They can also see how this once very wasteful environment is sustaining itself in the greenest way possible. The restaurant industry is a trillion dollar industry with sales estimated to a reach a record $560 billion in 2009 (restaurant.org). Now is the time that customers are looking for more during their restaurant experience and it can be given to them.

1.3 Literature Review

This is a consumer nation. According to the *New Shorter Oxford English Dictionary,* "consume" means to "destroy by or like fire or (formerly) disease." This means then as a society, citizens are "destroying" and "use up" the earth (Orr 174). Every person in the United States generates four pounds of waste per day (Miller). People "waste 28 billion pounds of food, 300 billion pounds of organic and inorganic chemicals used for manufacturing and processing, and 700 million pounds of hazardous

waste generated by chemical production..." (Orr 176). Surprisingly though, "only 63% [of Americans] were aware that human beings negatively affect biodiversity. This was the lowest response among the citizens of 20 countries surveyed" (Orr 89). Hopefully, through education and ecological design, these statistics can change and so can our culture.

1.3.1 What is Ecological Design?

Ecological design is "the careful meshing of human purposes with the larger patterns and flows of the natural world and the study of those patterns and flows to inform human actions" (Orr 104). In this day and age, people have lost touch with nature and the world outside of their homes and businesses. It is hard to believe that "our children, consumers in training, can identify over a thousand corporate logos but only a dozen or so plants and animals native to their regions" (Orr 177)? It is an innate lack of knowledge that was lost generations ago, and this must change for our future's sake. A majority of our society sit in ignorance or denial about the state of our earth. "The antidote to ignorance is knowledge with a caveat: when ignorance ends, negligence begins" (Bonda and Sosnowchik 17).

Where should ecological design be integrated? All forms of design can benefit from an ecological standpoint, but this study will focus on buildings, and more specifically, restaurants. It only makes sense to take advantage of these popular social communities and turn them into an educational and enjoyable experience. They will "become a way to teach about land use, landscapes, and human connections" (Orr 32). "In other words, ecological design becomes a way to expand our awareness of nature and our ecological competence" (Orr 32).

Biophilic design incorporates “real or simulated natural elements in an effort to promote well-being (Sole-Smith). It is an attempt to bring people back in touch with nature through the design of a building or space, something that should feel natural and comfortable. Considering biophilia in design is very important for two reasons: the productivity, health, learning, and healing benefits and the outcome of enhanced appreciation of nature which directly affects the way people treat the environment (Wilson). These two points can benefit any kind of building whether it is a hospital, school, office, or restaurant. In each there are advantages to improving attitude, performance, and health of the people working or living there (Wilson).

This study is specifically geared towards finding out how biophilic design can successfully “inspire interest – and appreciation of – nature” which then can “motivate people to protect the environment and preserve natural areas” (Wilson). The following is a table from the book Building for Life that lists out the different elements of biophilic design that can be incorporated into buildings or spaces.

Elements of Biophilic Design	
Prospect (ability to see into distance	-Brightness in the field of view (windows, bright walls) -Ability to get to a distant point for a better view -Horizon/sky imagery (sun, mountains, clouds -Strategic viewing conditions -View corridors
Refuge (sense of enclosure or shelter)	-Canopy effect (lowered ceilings, screening, branchlike forms overhead)
Water (indoors or inside view)	-Glimmer or reflective surface (suggests clean water) -Moving water (also suggests clean, aerated water) -Symbolic forms of water
Biodiversity	-Varied vegetation indoors and out (large trees, plants, flowers) -Windows designed and placed to incorporate nature views -Outdoor natural areas with rich vegetation and animals
Sensory variability	-Changes and variability in environmental color, temperature, air movement, texutres, and light over time and spaces -Natural rhythms and processes (natural ventilation and lighting
Biomimicry	-Designs derived from nature -Use of natural patterns, forms, and textures -Fractal characteristics (self-similarity at different levels of scale with random variation in key features rather than exact repetition)
Sense of Playfulness	-Incorporation of decor, natural materials, artifacts, objects, and spaces whose primary purpose is to delight, surprise, and amuse
Enticement	-Discovered complexity -Information richness that encourages exploration -Curvilinear surfaces that gradually open information to view
Source: Building for Life - Stephen R. Kellert 2005 page 129	

TABLE 1: Elements of Biophilic Design (Building for Life 2005)

1.3.2 Environmental Awareness

"About 80% of Americans are heavily influenced by incorrect or outdated environmental myths" (NEETF). Research conducted by NEETF/Roper "finds that about 50% to 70% of adults have 'heard of' most major environmental subjects such as water and air pollution, energy efficiency, solid waste, habitat loss, and climate change. Those people who have a decent working knowledge of environmental issues are 5% to 50% "more likely to engage in personal environmental actions" (NEETF).

Environmental Myths, by Gender

Percent answering question correctly

	Total	Male	Female
Definition of watershed	41	49	33
Only current source of CFCs in the U.S.	33	37	30
How most of the electricity in the U.S. is generated	27	36	19
The goal of paper recycling programs	24	25	24
The greatest source of landfill material	23	28	19
Most common source of water pollution	22	29	15
How U.S. disposed of spent nuclear fuel	17	21	14
Primary source of oil in nation's rivers, lakes, bays	16	20	11
The leading cause of entanglement	10	9	10
The leading cause of childhood death worldwide	9	11	8

Source: NEETF & Roper Starch Worldwide, 1998

TABLE 2: Environmental Myths, by Gender (NEETF 1998)

Although a large percentage of the population is knowledgeable, NEETF/Roper finds that only 1% to 2% knows enough to be considered "environmentally literate." In fact, "the public correctly answered an average of just 4.1 of the 10 energy [quiz] questions" (NEETF). When asked about the world's oxygen generation, 75% incorrectly

said forests generate more than oceans, when the opposite is true, and 60% did not know that more species live in oceans than on land (NEETF 13). Only 22% knew that runoff is "the most common form of pollution of streams, rivers, and oceans" (NEETF 24). From CFC statistics, to wildlife entanglement, to landfill material, Americans continually scored low percentiles. "Only 27% of Americans know that most of our electricity is produced by burning coal and other flammable materials" (NEETF 27).

The main problem that needs to be addressed is the fact that "most Americans believe they know more about the environment than they actually do" (NEETF v). This will become a real issue when "members of the public will be unprepared for increasing environmental responsibilities in the coming years" (NEETF). In 2001, three out of four Americans claimed to know "a lot" or "a fair amount" of knowledge about energy, but only 12% passed the quiz (NEETF 16). NEETF/Roper believes one of the reasons for the knowledge gap is a "terminology disconnect," meaning the media either uses words that are unknown to the public or not grasped (NEETF 13).

By far, the media is the "leading source of environmental information for adults" (NEETF 15). Very few go out of their way to find information; "it seems fair to say that most information gathering happens in a fairly haphazard manner" (NEETF 15).

Major Sources of Environmental Information

Percentage of adults responding

Mode	2000	2001
Television	59%	63%
Newspapers	57%	59%
Environmental groups	39%	31%
Radio	33%	32%
Product packaging	n/a	27%
Government	27%	n/a
Internet	19%	23%
Your children	16%	11%
Large companies	13%	n/a

Sources: Roper, 2000 and 2001

TABLE 3: Major Sources of Environmental Information (Roper 2000 & 2001)

1.3.3 Environmental Education

"If we are ever to get real control of environmental problems in the U.S. and abroad, we will need a public with a sound base of education, able to understand these problems and address them at their source" (NEETF).

According to the National Environmental Education & Training Foundation (NEETF), "environmental education can guide the public to simple actions that could save at least $75 billion annually." "People want to understand environmental issues and how they apply to their daily lives." (NEETF ii). Statistics show that 90% of people think that adults should receive environmental education (NEETF).

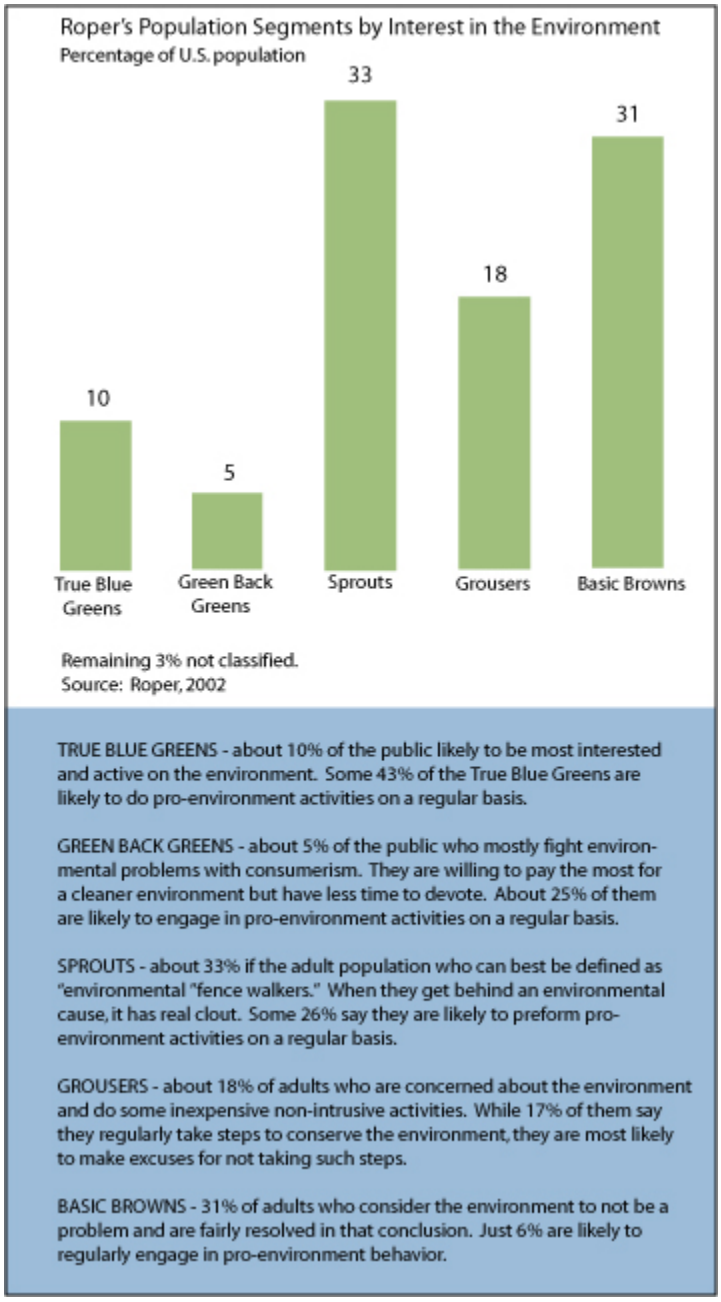

TABLE 4: Roper's Population Segments by Interest in the Environment (Roper 2002)

The study conducted by the NEETF found "that a higher level of environmental knowledge correlates significantly with a higher degree of pro-environment behavior". Research shows that people with environmental knowledge are 10% more likely to save

energy in the home and purchase environmentally safe products, 50% more likely to recycle and avoid using chemicals in yard care, and 31% more likely to conserve water (NEETF 42). The goal is not to turn everyone into an "environmental encyclopedia" but let them have a working understanding of important "casual relationships" such as air and water pollution, recycling, species loss, etc (NEETF 14).

Quantifying Personal Environment Conduct Savings

A calculation of what an improved level of environmental knowledge might mean for savings in the national economy. It was compiled from a cursory review of government websites and information sources.

Activity	Current Expendiatures	% Change in Participation	Estimated Savings	Education Goal
Domestic electricity use	$233 billion	5	$11.5 billion	Lower home heat Raise AC temp Install low usuage bulbs and appliances
Gasoline use	$137 billion	5	$6.8 billion	Fuel efficient cars Driving habits
Domestic water use	$285 billion	5	$14.2 billion	Water saving habits and appliances
Small business overhead	$500 billion	5	$25 billion	Energy and water savings, recycling
Health care costs	$900 billion	2	$18 billion	Hazard prevention in home and office
TOTAL ANNUAL SAVINGS			$75.5 billion	

Sources: Electricity - US Dept. Energy, Gasoline - US Dept. Energy, Water - US Geological Survey, Small Business - US Commerce Dept., Health - CDC, Recycling - US EPA

TABLE 5: Quantifying Personal Environment Conduct Savings

An obstacle that needs to be overcome is negative attitudes of a lot of American people. "Humans tend to prefer the comfort associated with familiarity and so often we find it difficult to deviate from out established practices, especially if there is risk involved" (Bonda and Sosnowchik 18). It is also common for them to "feel that small personal sacrifices won't mean anything when compared to the responses of a company or public institution" (NEETF 33). It needs to get out that the individual footprint does

make a difference and "greater focus on the individual's environmental impact … is appropriate" (NEETF 33). "Our 4% of the world's population consumes 25% of the world's energy (NEETF 33). The 2000 Green Gauge found that 56% of Americans want to do more but just do not know how. This is evidence that "people [will] respond positively on the environment when they know what to do" (NEETF 34). In the end, "the assurance that individual action can make a difference is key to the success" of environmental education programs (NEETF 34).

Percentage of Americans Performing Environmental Activities Frequently in Day-to-Day Life

Percent Responding	2000	1999	1998
Turn off lights and electrical appliances when not in use	85	83	85
Conserve water in your home and yard	61	64	65
Recycle things such as newspapers, cans, and glass	59	59	61
Try to cut down onthe amount of trash and garbage you create	54	57	62
Buy biodegradable or recyclable products	42	46	50
Avoid using chemicals in your yard or garden	36	39	39
Use other types of transportation ... instead of driving your car	14	15	16
Participate in a volunteer clean-up day	9	10	8
Question wording: Now I would like to ask you about some of the things you may do in your day-to-day life. For each of the following things, would you please tell me whether you never do it, sometimes do it, or frequently do it.			

Source: NEETF & Roper, 2001

TABLE 6: Percentage of Americans Performing Environmental Activities Frequently in Day-to-Day Life (Roper 2001)

In conclusion, environmentally educated Americans will "understand how their actions affect the environment, be able to communicate their attitudes toward the environment with others, and become more involved in activities which directly or indirectly benefit the environment" (NEETF 40).

1.3.4 Learning on the Outside – Social Mediums

According to John Faulk, head of the Institute for Learning Innovation, over a lifetime, over 90% of learning occurs outside of school. He points out that there is a lot of "free choice learning" all around us. For example, a few places that have started to take environmental education seriously are zoos, aquariums, arboreta, botanical gardens, national state parks, and nature centers (NEETF 45).

It is hopeful to think that from gaining this knowledge from social mediums, people will develop "personal conduct knowledge" which is a combination of awareness and action (NEETF 55). People will "make a connection between the environment and their own conduct," then "go a step further by taking action" (NEETF 55). These people end up being 5% to 50% more likely to take action (NEETF 55).

1.3.5 Restaurant Statistics

The restaurant industry is a booming economical powerhouse. In fact, "the overall economic impact of the restaurant industry was expected to exceed $1.3 trillion in 2007" (restaurant.org). With 2009 sales predicted to be around $560 billion, it is obvious that these food service places are here to stay (restaurant.org). People cannot get enough of the ease and convenience of eating out. Statistics show that "the average household expenditure for food away from home in 2005 was $2,634 or $1,054 per person" and that "four out of five consumers agree that going out to a restaurant is a better way to use their leisure time than cooking and cleaning up" (restaurant.org). On a typical day in 2007, restaurant sales reached $1.5 billion (restaurant.org). Table 7 shows restaurant industry sales from past to present and the bulleted items show some surprising restaurant statistic from Restaurant.org.

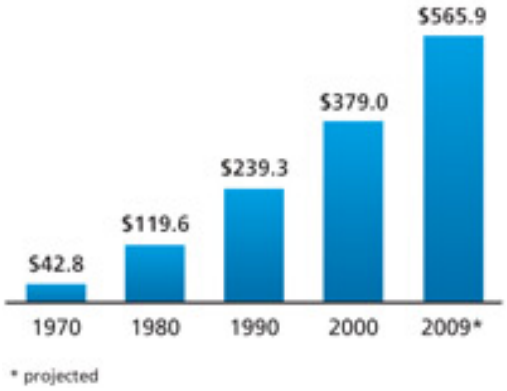

TABLE 7: Restaurant Industry Sales (Restaurant.org)

- **$1.5 billion** — Restaurant-industry sales on a typical day in 2009.
- **76 percent** — Percent of adults who said they are trying to eat healthier now at restaurants than they did two years ago.
- **70 percent** — Percent of adults who said they are more likely to visit a restaurant that offers locally produced food items.
- **69 percent** — Percent of adults who said purchasing meals from restaurants, take-out and delivery places makes it easier for families with children to manage their day-to-day lives.
- **52 percent** — Percent of adults who said they are likely to make a restaurant choice based on how much a restaurant supports charitable activities and the local community.
- **27 percent** — Percent of adults who said that when it comes to choosing a restaurant, they are paying more attention to coupons and value specials than they were two years ago.

Even though dining out is still very popular, "Americans are expecting more from their restaurant experience than ever before" (restaurant.org). Currently there are about 935,000 restaurants that are "ready to deliver" and "satisfy increasingly adventurous diners who also place a high premium on convenience and value" (restaurant.org). Helping out the restaurant industry is the "increasing use of technology to make operations more efficient and allow diners more control over their dining experience" (restaurant.org). According to Restaurants USA, "Consumers now expect an entertaining atmosphere to enhance the entire dining experience, and more restaurateurs are catering

to that desire with innovative and exciting designs." The competition is huge, and "operators are investing more than ever before … as they strive to create a setting that will set them apart …" (Restaurants USA). In general, Architect David Shultz says, "Restaurant design is becoming even more exciting with new approaches to dining" (Restaurants USA). In conclusion, Shultz states, "Restaurateurs need to be thinking all the time about how to create a fantastic restaurant experience—making a restaurant visit more than just a good meal" (Restaurants USA).

One can imagine that with an industry this vast, a lot of waste has to be produced and managed. It is a huge market with an even bigger ecological footprint. According to the Green Restaurant Association, "the average restaurant generates 50,000 pounds of garbage and uses 300,000 gallons of water in a single year." Food waste is also a huge issue and is in fact "recognized as the third largest component of generated waste and the second largest component of discarded waste" (NCDENR). "Americans generate over 14 million tons of food waste annually according to the US Department of Agriculture" and only 4.1% is composted (NCDENR). According to the National Restaurant Association, about "20% of all food prepared commercially in the US goes to waste. Additionally, almost 30% of a restaurant's garbage is made up of food waste. That includes food prep waste, served but uneaten food, unserved food and spoiled food."

1.3.6 The Green Restaurant

Out of the nearly one million restaurants in the United States there are about 300 that are working to make a difference. These restaurants are certified by the Green Restaurant Association and work to make changes "to combat global warming, waste, and pollution" (Stukin). The movement is really catching on, and quickly too. Two

years ago the GRA only had 60 certified restaurants (Dateline). "The group is also negotiating with major restaurant chains, which could rapidly boost membership to 5,000 (Dateline).

At Habana Outpost in Brooklyn, NY, owner Sean Meenan is making a difference with simple economic solutions. A bicycle-powered blender "whirls fresh fruit into frosty drinks" (Stukin). In addition, his restaurant is the first solar powered eatery in New York City (Stukin). He has also incorporated "a fiber-optic chandelier [that] literally brings sunlight from the outside in," booths upholstered in recycled sails, and cups and utensils made from biodegradable cornstarch (Stukin).

There are so many simple steps restaurants can take to minimize their ecological footprint that are not as involved as installed solar panels. "A lot of this stuff is just common sense," says Chef Eric Tucker. For example, there are choices like compact florescent bulbs, products that do not have excessive packaging, timed bathroom lights, natural cleaning products like borax and lemon juice, fryer oil for biodiesel fuel, and energy star appliances (Stukin). It also helps to have a recycling system incorporated into the kitchen and dining area. In addition, it could be possible to "work with suppliers to take back and reuse corrugated cardboard boxes, five gallon buckets, and other packaging" (NCDENR).

Another way of leaving less of a footprint is going local with food purchases. "Choosing local meats, vegetables, fish, and fruit over those shipped thousands of miles away" not only helps the earth but supports smaller local ranchers and farmers (Wood). "Shipping a pound of apples from a farm in Iowa to a market in Washington requires 30% more fuel and releases 30% more greenhouse gases than shipping those apples to a

local market in Iowa" (Treehugger.com) "Food today travels between 1,500 to 2500 miles from farm to market" which is 25% farther than it was two decades ago (Treehugger.com). And if that is not enough of an incentive, the National Restaurant Association ranked local produce number one on its list for top hot trends of 2009 (Restaurant.org).

Composting food leftovers after a meal is a very effective way to manage waste. "Compost reduces waste stream, cutting back on landfills and incineration" and "about 70 percent of what [people] throw away is, theoretically, compostable" (Pennybacker). It "consists of organic material that has been broken down, or processed, by fungi, bacteria, microorganisms, and earthworms" resulting in a valuable resource (Pennybacker).

Finally, one last way to go eco-friendly is buying organic foods. These foods are grown in healthy ecosystems where the land is protected and wildlife is allowed to thrive (Treehugger.com). These foods are grown in a way that "supports healthy people and a healthy planet" (Treehugger.com). They taste better and are healthier due to the fact that they are pesticide free and not genetically modified (downtoearth.org). Studies found that "organic crops had higher average levels of all 21 nutrients analyzed" (downtoearth.org). And finally organic farming saves money because it does not require the $3-4 billion a year in pesticide costs (downtoearth.org). Organic foods were ranked number 2 on the hot trends list for 2009 (Restaurant.org).

The following are more tips to green restaurants from NPS.gov:

- Eliminate the use of beverage contained with detachable flip-top lids.
- Minimize the use of throw-away plastic cups, plates, and bowls.
- Minimize the use of nonbiodegradable cleaning products.

- Purchase in bulk such items as sugar, jellies, butter, and eggs to reduce packaging and waste.
- Consolidate ordering of supplies to reduce traffic and fuel consumption from delivery trucks.
- Establish no-smoking sections.
- Offer vegetarian meals to encourage visitors to eat lower in the food chain.
- Use cans instead of bottles to reduce landfill until glass can be recycled.
- Use boric acid for roach control instead of poisons.
- Encourage less beef to protect rain forests.
- Offer food waste to farmers for animal food.

1.3.7 Materials, Technology, & Construction

> Practically speaking, the ideal totally green facility would have no negative impact on the environment, would use only sustainable or renewable resources, and all material components would be returnable to their manufacturer after the end of their useful life to be used as food for another material. (Bonda and Sosnowchik 10)

Since constructing a no waste environment would be a huge undertaking, there are some simpler ways to make less of an impact on the earth. "Nature provides us with everything we need to be sustainable and healthy with minimum impact on the environment" (Bonda and Sosnowchik 11).

To achieve this, some eco-friendly systems need to be incorporated and installed. The first step is harvesting rainwater. This free source of soft water gets pumped back into the building and used in bathrooms and laundry rooms. If treated, the water can even be safe to drink (RSMeans). To take it a step farther, this water can be rationed out by installing composting toilets, waterless urinals, and low-flow toilets (RSMeans 57).

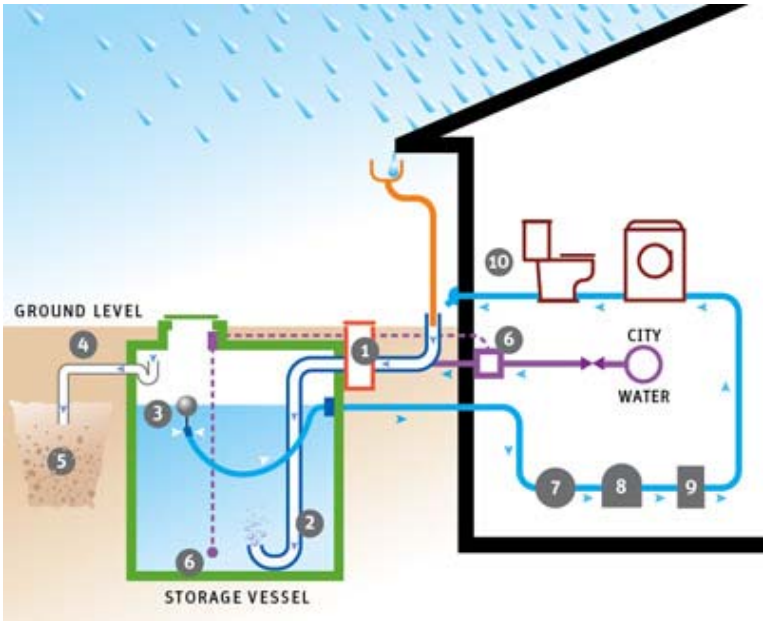

FIGURE 1: Harvesting Rainwater (dreamworkbuilders.com)

Green roofs are another way to make a difference. These live roofs consist of a waterproofing layer on the roof, covered with anything from grass to a garden (RSMeans 76). Not only do these roofs provide insulation and oxygen, they "minimize the impact of the site's impervious surfaces" (RSMeans 76). There are some things to be aware of, such as adequate waterproofing and maintenance, but the energy saving benefits of green roofs makes it worth pursuing.

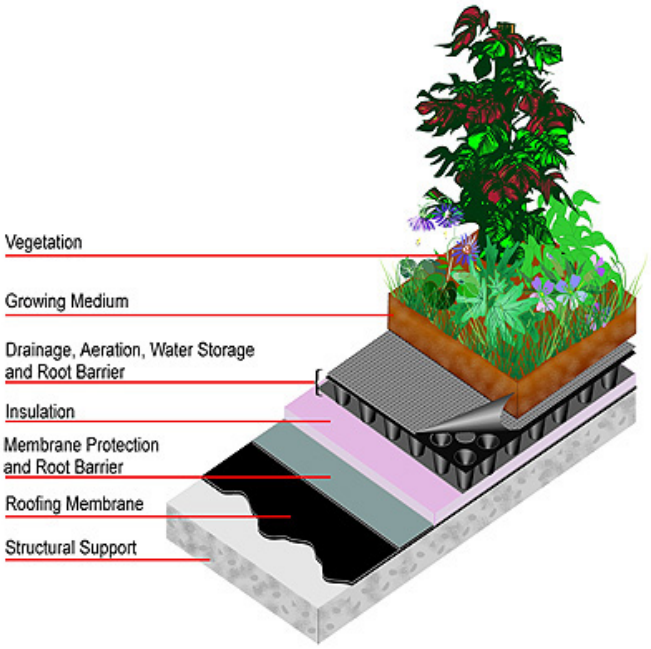

FIGURE 2: Green Roof (sitemaker.umich.edu)

According to the National Restaurant Association, there are nearly one million restaurants in the United States and they consume more electricity than any other category of retail outlet. A very important technology to work into the green restaurant is passive and active solar energy. "The amount of [solar energy] that reaches the earth each day is more than the planet's 5.9 billion people would consume in 27 years" (RSMeans 53). There are so many ways people can take advantage of what the sun is freely giving out. People can actively use solar energy by installing Photovoltaic (PV) systems which turn the suns energy into clean usable energy (RSMeans 53). Another way to save 40% of energy is to face the long side of the building "within 15 degrees of true south" (RSMeans 8).

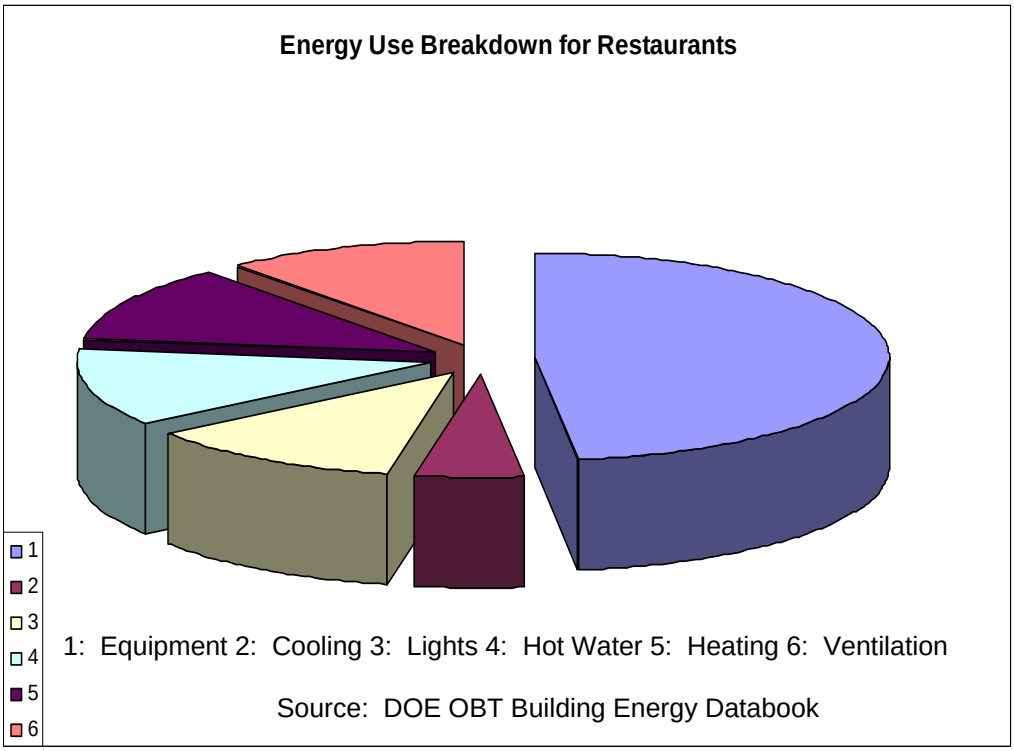

TABLE 8: Energy Breakdown for Restaurants (Building Energy Databook)

Material choices can make a huge difference in the sustainability and health of a building. By using low-VOC (volatile organic compound) paints and stains, recycled fabrics, organic textiles, and renewable and biodegradable products, a green building can be achieved. Cork, bamboo, and concrete are all very popular green material choices. Even the framing, sheathing, and insulation for the building can be recycled materials (RSMeans 78). Eliminating carpeting or using one that can be recycled is also important. "Each year in the United States landfills acquire millions of tons of carpet that may take 20,000 years to decompose (RSMeans 49).

A healthy interior is just as important as what makes up the bones of the structure. "Researchers in a field called 'biophilia' are studying the correlation between building ecology and good health" (RSMeans 21). They believe that humans thrive in natural

environments, and when connecting it with a building, they are positively impacted (RSMeans21). Managing indoor air quality is one way to "naturalize" the interior. Certain plants like English Ivey, Peace lily, Weeping fig, and Bamboo pal, help clean indoor air (RSMeans 149). In addition, incorporating Feng Shui influences can create a calming and balanced interior (Bonda and Sosnowchik 258).

All in all, a green building is a healthy and happy building leading to 100% "healthier" customers and workers and a 96% of people with an increase in spirit and energy (Bonda and Sosnowchik 239).

Sustainable vs. Nonsustainable Design Maintenance

Sustainable Design	Nonsustainable Design
Durable Material from natural, renewable, or recyclable sources	High-energy/high resource impact material selection with short life expectancy
Lower energy consumption and resource demands	High utility cost
Operational mandate and direction	Lack of operational manuals and direction
Helps promote: lower operational costs high visitor satisfaction reduced maintenance staff with higher morale little redesign or rehabilitation	Leads to: high operational costs low visitor satisfaction large maintenance staff frequent rehabilitation and/or replacement

Source: NPS.gov

TABLE 9: Sustainable vs. Nonsustainable Design Maintenance (NPS.gov)

According to NPS.org, the following is a checklist for sustainable building design:

The design must

- be subordinate to the ecosystem and cultural context

    - respect the natural and cultural resources of the site and absolutely minimize the impacts of any development
- reinforce/exemplify appropriate environmental responsiveness
    - educate visitors/users about the resource and appropriate built responses to that environment.
    - interpret how development works within natural systems to effect resource protection and human comfort and foster less consumptive lifestyles
    - use the resource as the primary experience of the site and as the primary design determinant
- enhance appreciation of natural environment and encourage/establish rules of conduct
- create a "rite of passage"
    - develop an entrance into special natural or cultural environment that emulates the respectful practice of removing shoes before entering Japanese home . . . leaving cars and consumptive values behind
- use the simplest technology appropriate to the functional need, and incorporate passive energy-conserving strategies responsive to the local climate
- use renewable indigenous building materials to the greatest extent possible
- avoid use of energy intensive, environmentally damaging, waste producing, and/or hazardous materials
    - use cradle-to-grave analysis in decision making for materials and construction techniques
- strive for "smaller is better" . . . optimizing use and flexibility of spaces so overall building size and the resources necessary for construction and operation are minimized
- consider "constructability" . . . striving for minimal environmental disruption, resource consumption, and material waste, and identifying opportunities for reuse/recycling of construction debris
- provide equal access to the full spectrum of people with physical and sensory impairments while minimizing impacts on natural and cultural resources

Also, the design should

- consider phasing the development to allow for monitoring of resource impacts and adjustments in subsequent phases
- allow for future expansion and/or adaptive uses with a minimum of demolition and waste
    - materials and components should be chosen that can be easily reused or recycled
- make it easy for the occupants/operators to recycle waste

1.3.8 The Business Case

What exactly is the incentive, besides the obvious, to make an effort to go green? "Surveys show that Americans are concerned about the environment," therefore they "appreciate restaurants and other businesses that make efforts to be more environmentally aware" (NCDENR). Pretty much every green move has some kind of positive effect: By simply reducing waste, operating the business becomes more efficient and collection and disposal costs are reduced (NCDENR). Artificial light accounts for up to 44% of energy bills (busjrnl.com). According to studies done by the Heschong Group, by light piping, sky lighting, or just bringing in natural light, sales increase up to 40% (TreeHugger.com). In addition, sunlight will make the workers happier, more productive, and more efficient (busjrnl.com). "A green environment will advance the health of everyone in the business" (busjrnl.com).

1.3.9 Conclusions

No harm can come from gaining new knowledge in new places; in fact, it has been proven that knowledge brings about positive changes. It is a small step to create one sustainable restaurant which informs its patrons, but this one space can inspire and educate an endless amount of people. The idea of getting environmental education can even go beyond the restaurant business, and expand to other social areas. The proposal is to expand biophilic design and education to end ignorance so the world can start making positive changes.

1.4 Objectives of Study

- To create a design approach to guide restaurateurs when creating or modifying a new or existing restaurant environment and experience
- To educate the American population about the environment through a common social medium; the restaurant
- To improve low statistical figures about America's environmental literacy by "teaching" at a restaurant
- To create an appreciation for nature, improve environmental stewardship through the biophilic design of the restaurant
- To show how an eco-friendly restaurant can take advantage of the thousands of people who spend time within its walls by educating them
- To identify a link between environmental education and taking action
- To show that there is a gap in the restaurant industry, that no one thus far has used them to educate the public
- To show that environmental/biophilic design can influence, motivate, and educate
- To create an approach that can later be modified to use as design tool for places other than the restaurant and to teach about things other than nature and sustainability

1.5 Definition of Terms

Active wall: a generator or collector of energy. Can be double paned glass wall or a wall of PV panels (RSMeans 78)

Bio-energy – any renewable energy or fuel derived from biological sources (energy.gov.ab.ca).

Biomimicry: In design, involves taking inspiration from nature to solve design problems (Thorpe 46).

Biophilia: A concept defined by Harvard biologist E.O. Wilson, who coined the term as "the connections that human beings subconsciously seek with the rest of life" (Bonda and Sosnowchik).

Building-related illness: Diagnosable illness whose cause and symptoms can be directly attributed to a specific pollutant source within a building (Bonda and Sosnowchik).

Certified wood: Wood-based materials used in building construction that are supplied from sources that comply with sustainable forestry practices, protecting trees, wildlife habitat, streams, and soils as determined by the Forest Stewardship Council (Bonda and Sosnowchik).

Chlorofluorocarbons: A family of inert, nontoxic, and easily liquefied chemicals used in refrigeration, air-conditioning, packaging, and insulation, or as solvents and aerosol propellants (Bonda and Sosnowchik).

Compostable: The ability of a material or product to be used as compost. Refers to any organic substance which can be returned to the soil and biodegradable without any harmful effects (Bonda and Sosnowchik).

Daylighting: Natural daylight introduced into interior spaces and controlled specifically to reduce levels of electric lighting, minimize glare, and optimize lighting quality (Bonda and Sosnowchik).

Ecological design: the careful meshing of human purposes with the larger patterns and flows of the natural world and the study of those patterns and flows to inform human actions (Orr 104).

Eco-efficiency: A strategy that calls for minimizing harm to natural systems by reducing the amount of waste and pollution generated by human activities (Bonda and Sosnowchik).

Energy Star rating: The designation given by the EPA and the U.S. Department of Energy to appliances and products that exceed federal energy efficiency standards (Bonda and Sosnowchik).

Environmental sustainability: Long-term maintenance of ecosystem components and functions for future generations (Bonda and Sosnowchik).

Experience Design: an approach to creating successful experiences for people in any medium. This approach includes consideration and design in all 3 spatial dimensions, over time, all 5 common senses, and interactivity, as well as customer value, personal meaning, and emotional context. Experience Design is not merely the design of Web pages or other interactive media or on-screen digital content. Designed experiences can be in any medium, including spatial/environmental installations, print products, hard products, services, broadcast images and sounds, live performances and events, digital and online media, etc.

Graywater: Domestic wastewater composed of washwater from kitchen, bathroom, and laundry sinks, tubs and washers (Bonda and Sosnowchik).

Harvested rainwater: Rainwater captured and used for indoor needs, irrigation, or both (Bonda and Sosnowchik).

Living roof/Green roof: Waterproof membrane applied on a roof deck, covered with earth what will grow grass or other vegetation to collect rain and minimize the impact of the site's impervious surfaces (RSMeans 77).

Modular Architecture: Refers to the design of any system composed of separate components that can be connected together. The beauty of modular architecture is that components (modules) can be replaced or added without affecting the rest of the system (webopedia.com).

Photovoltaic: Capable of producing a voltage when exposed to radiant energy, especially light (Bonda and Sosnowchik).

Stewardship: The careful and responsible management of something entrusted to one's care

Sustainability: A resource or system that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Bonda and Sosnowchik).

Sustainable Design: Theories and practices for design that cultivate ecological, economic, and cultural conditions that will support human well-being indefinitely (Thorpe 12)

1.6 Assumptions of Study

After gaining preliminary research and information through the literature review, some assumptions have been made:

Assumption #1: "What we don't know can't hurt us." This is one of the most dangerous mindsets a person can have. Knowledge is power, especially when speaking in terms of bettering the world.

Assumption #2: By developing a design approach to help restaurateurs create an educational and eco-friendly space, what once might have felt overwhelming and impossible will now be easy, organized and effective.

Assumption #3: By creating a restaurant environment with the purpose to enhance a culture's environmental knowledge, two things get done: Creating a green, sustainable business and educating any person who enters its doors. In the end, people's eyes will be open to new ideas, systems, and materials that hopefully will be applied in their life and affect everyone's future.

Assumption #4: This newfound appreciated of the environment will create a snowball effect on the way people run their lives, restaurateurs run their restaurants, and business owners run their businesses.

1.7 Scope and Limits

The research collected was limited to the U.S. and Canada. Some areas of the world may not have access to all the types of technology and materials discussed in the project. Some regions of the country may not get the sufficient amount of rainfall required for a rainwater reuse system. Some regions of the country may not have the option to acquire local produce.

The primary function of the study is to create an approach to design an educational restaurant environment and experience and show that environmental education can come from somewhere other than the media and the classroom. It may be that not all people are able to learn in this type of environment, where most of the information will be gathered voluntarily and visually.

1.8 Procedures and Methods

The goal of the study is to create an approach to design an eco-friendly restaurant that has intentions to pass information to its customers through visual elements, written elements, and hands on activities. To achieve this, many areas will have to be studied:

- Identify and evaluate restaurant trends.

  -The National Restaurant Association has studies regarding trends.

  -Evaluate which trends are the most popular and long living.

  -Study how the general public feels about gaining environmental knowledge in a restaurant.

  -Learn about organic foods/drink and their popularity in the market.

- Research America's environmental literacy.

  -The National Environmental Education & Training Foundation completed a ten year study regarding America's environmental literacy.

- Research how to educate using different methods such as visual elements, written literature, or hands on experiences.

  -Research teaching websites and other online sources to find which ways are the most efficient to present information.

  -Study other restaurateurs who have incorporated similar aspects in their restaurants and find out tips, tricks, and methods they used.

- Gain a working knowledge of complex technologies and systems to be worked into the restaurant.

  -Find the most workable solutions through many informative websites and books

-Research energy star appliances and other energy saving technologies.

-Find simple diagrams and explanations to use in the restaurant to let public better understand these systems.

- Make sure the materials used inside are renewable and sustainable as well as durable

-Research different materials and determine which would work best for different applications in the restaurant: for education and functionality.

-Use low odor materials and zero emitting materials.

-Use recycled materials or repurposed materials.

- Make sure the overall aura and feeling of the restaurant are comfortable, healthy, and serene

-Work into the space air filtering plants.

-Research Feng Shui elements.

-Allow for a lot of natural light.

-Incorporate good ventilation.

-Use pleasing colors.

1.9 Anticipated Outcome

All of these findings should prove that people are looking for more from their restaurant experiences. The public would like to have their downtime in a restaurant filled with entertaining activities and interaction that subconsciously instills knowledge in them. Studies have proven that the general public thinks they know more about the environment than they actually do. By learning in the restaurant they can become confident about the knowledge they have.

This study will inspire restaurateurs to take some initiative in their own businesses and apply some of the methods and practices of the approach to lessen the footprint they leave on the environment. Once business owners see that it can be done, and it is not overly complicated, they will become enthused. In addition, once they see the statistics showing that people are more likely to choose an eco-friendly eatery over a typical wasteful one, there will be a business incentive to go green as well.

The final solution will be an example of an eco-friendly restaurant created by the design approach. Through its design, activities, and materials, patrons will be entertained, involved, and inspired. It will not be a stuffy place that lectures patrons, but just the opposite. Patrons can take in information as they choose. One can inquire about the flooring and be told the benefits, price, and where it can be purchased. One can check out a solar-power diagram on the ceiling and learn that it is possible to generate clean energy simply. Then, one can order a meal from the menu and find out that the produce was grown locally and is 100% organic.

In the end, all of these components will come together to start a new trend in the restaurant industry. It is not about who is a tree hugger and who is not, but about who is smart about the choices they make and who is oblivious or ignorant. Hopefully, each year more and more restaurants will take on a approach thus gradually informing more and more of society, making positive changes in environmental stewardship, and simultaneously reducing negative impacts on the world.

CHAPTER 2: DESIGN RESEARCH

2.1 The Restaurant

Why do people go to restaurants? According to restaurateur Michael Whiteman, "It gives us a way to explore the world." The restaurant is "a place to see and be seen" (Dorf 34). Consumers are now expecting an entertaining atmosphere to "enhance their entire dining experience, and more restaurants are catering to that desire with innovative and exciting designs" (Hamaker). The restaurant industry is always growing, and there is a lot more emphasis placed on "total entertainment" resulting in "more exciting and new approaches to dining" (Hamaker). "Gimmicks attract tourists and curiosity seekers, but you need more emotional resonance…to sustain clientele" (Pastrel). It is all about the experience that is had and that experience must be one that is meaningful and designed well.

2.1.1 Interior Requirements

There are a lot of code requirements to follow when designing the interior of a restaurant. According to Martin Dorf they are as follows (39-40):

1. All materials used for interior finish and trim shall be classified in accordance with ASTM E84.

2. Interior finish includes wainscoting, paneling, or other finish applied structurally or for acoustical treatment, insulation, decoration, or similar purposes.

3. Interior wall and ceiling finish materials that have a smoke-developed rating greater than 450 when tested with ASTM E84 shall not be permitted.

4. Foam plastics shall not be used.

5. Vertical exits and passageways must have a flame spread classification of I (0-25); corridors providing exit access must be I (0-25); rooms or enclosed spaces must be II (25-75).

6. Interior trim, including baseboards, chair rails, moldings, etc., not in excess of 10 percent of the aggregate wall and ceiling areas can be class I, II, or III.

7. Floor finish: Traditional floor finished of wood, vinyl, linoleum, terrazzo, and other resilient floor coverings can be utilized without restriction.

8. Carpet manufactured for sale in the U.S. is required to pass the DOCFF-1 pill test.

9. Curtains, draperies, and hangings shall be noncombustible or be maintained as flame resistant.

10. The permissible amount of flame resistant decorative hangings shall not exceed 10 percent of the total wall and ceiling area.

11. All wall and ceiling finish materials in cooking areas must be smooth, washable, nonabsorbent, and water-resistant, including florescent lighting diffusers; all floors should generally be nonskid, acid-proof quarry or ceramic tile with cove basis; all plumbing fixtures must be properly connected, vented, and drained; all electrical conduits and pipes should be installed within walls to minimize collection of dust and bacteria; all equipment must be NSF approved and be sealed tight to surrounding surfaces.

2.1.2 Space Planning

"Restaurateurs should consider the flow of the space, lighting, materials, tables so that everything works together as part of a larger narrative … Think of it as creating a theatre experience" (Hamaker). Most people overestimate the amount of seats a room can fit. Most codes will allow 12-15 square feet per person for the dining room (Dorf 40). But do not be afraid to allow a little more space than the standard minimum. When spacing square tables, a diagonal arrangement is more efficient and is easier on the eye (Dorf 41).

For the bar, "figure in 2'4" in bar length per bar stool" (Dorf 41). The following is a list of necessities when setting up a bar in a restaurant: Computer, cash register, three-position sink with drain-boards on both ends, draft beer dispenser, speed rack, wine racks, ice bin, juice gun, glassware, trashcans, skid-proof slats on the floor, shelving, and mini-fridges (Herbert 29-30).

The bathroom is another important part of the restaurant which makes a huge impact on the kind of place the eatery is. Surprisingly, there are some ways to make the bathroom efficient as well. The typical toilets and urinals waste up to 84,760 gallons of water per year but there are better solutions out there (Bonda and Sosnowchik 70). Options like the dual flush toilet offer two volumes- 1.6 gallons per flush for solid waste and 0.8 to 1.1 gallons per flush for liquids and paper. Rainwater recovery systems or gray water systems can also be incorporated in the bathroom to use as toilet water.

2.1.3 The Kitchen

The kitchen, depending on the size of the restaurant and complexity of the menu, is usually 25 to 40 percent of the total restaurant area (Dorf 41). The kitchen is the most

important element in the restaurant. The following are basic components that all kitchens should have: An area for receiving deliveries; dry, refrigerated, and frozen storage areas; preparation areas for hot and cold foods; finishing, holding, and plating area; dishwashing area; refuse area for waste products; and finally a waiter's station (Dorf 43-44).

The following is a list of basic necessities that need to be incorporated into the areas listed above: A stove, broilers, grills, deep fryer, grill-area hood, fan duct to outside, preparation sink, sandwich board, 1-2 freezers, 1-2 refrigerators, toasters, shelving, pass through, fire protection system, knife holder, 3-4 fire extinguishers, garbage cans (Herbert 48-49).

2.1.4 Equipment

It is important to consider the future operating costs when purchasing kitchen equipment (Bonda and Sosnowchik 77). Out of more than forty different types of products, those with the lowest energy use earn the U.S. EPA's Energy Star rating (Bonda and Sosnowchik).

Ventilation hoods are a necessity in the kitchen. They remove "air, water, vapor, grease, and food odors … [as well as] air and water vapor…" (Birchfield and Sparrowe 238). There is also the option of natural ventilation, which cuts cost and provides cleaner air.

2.1.5 Lighting

"Perhaps the single most important design feature in a restaurant is lighting" (Dorf 49). It is the light that draws us into a restaurant, stimulating our senses and adding drama and excitement to a space evoking different moods (Dorf 49). According to Carroll Cline, lighting designer in New York, "The light in a restaurant should try to

embody the spirit of light outdoors by incorporating directional light (sunlight), overall and ambient light (skylight), and sparkle (the kind of light we see reflected on water or leaves) (Dorf 49). "Properly directed light can help dissolve negative feelings and tensions" (Birchfield and Sparrowe 252). Lighting must be accommodated to the types of activities being performed in the area. Brightness is important is areas where physical activity takes place like washing areas, receiving areas, stockrooms, assembly areas, and refrigerators (Birchfield and Sparrowe 256). Lights can be lower for accounting, cash handling, counter sales, waiting areas, expediting stations, and access corridors (Birchfield and Sparrowe 256).

The best source for light that we know of is the sun (treehugger.com). There are many way we can take advantage of this free, full spectrum light. Simple tasks like keeping blinds open can make a big difference. Other ways that are little more complex are installing skylights, design homes with many windows facing south, or even pipe light inside using fiber optics (treehugger.com). According to daylighting.org, "daylit buildings are just plain more cool—more environmentally, technologically, and anthropologically aware than traditionally lit buildings" (Bonda and Sosnowchik 164).

When natural light is not available, there are other energy saving options that can be incorporated into the space. Compact florescent bulbs (CFCs) use a quarter as much energy and last many times longer than incandescent bulbs. They come in a variety of shapes and sizes and also emit less heat (treehugger.com). Another option is LEDs (light emitting diodes) which are extremely energy efficient and extremely long lasting. They can reduce energy consumption by 80-90% and last around 100,000 hours

(treehugger.com). Whatever lighting type is chosen, be sure it is flattering to the customers and to the food; people want to look good and want their food to look good!

2.1.6 Category and Size

The restaurant that the approach will be applied to is categorized as a small, table service restaurant; this means it will seat from 50 – 100 people and that there will be waiters serving the tables. The size is very important to define in the design process because it directly affects all other aspects of the restaurant. Because it is in this size category, the space needed for receiving should be 60 – 80 square feet (80), space needed for garbage is 60 square feet (82), for dry storage is 100-150 square feet (83), for paper and cleaning storage is 75-150 square feet (83), for the dining room is 1400 square feet, and finally for the kitchen is 1300 square feet (91) (Birchfield and Sparrowe).

2.1.7 Taxonomy

One way to figure out what areas of an environment have room for improvement is by drawing up a taxonomy which deconstructs a situation into its component parts. Figure 3 represents the different component parts of the average restaurant experience and the interactions with person and place that occur. Figure 4 highlights certain areas that have room for improvement within the experience.

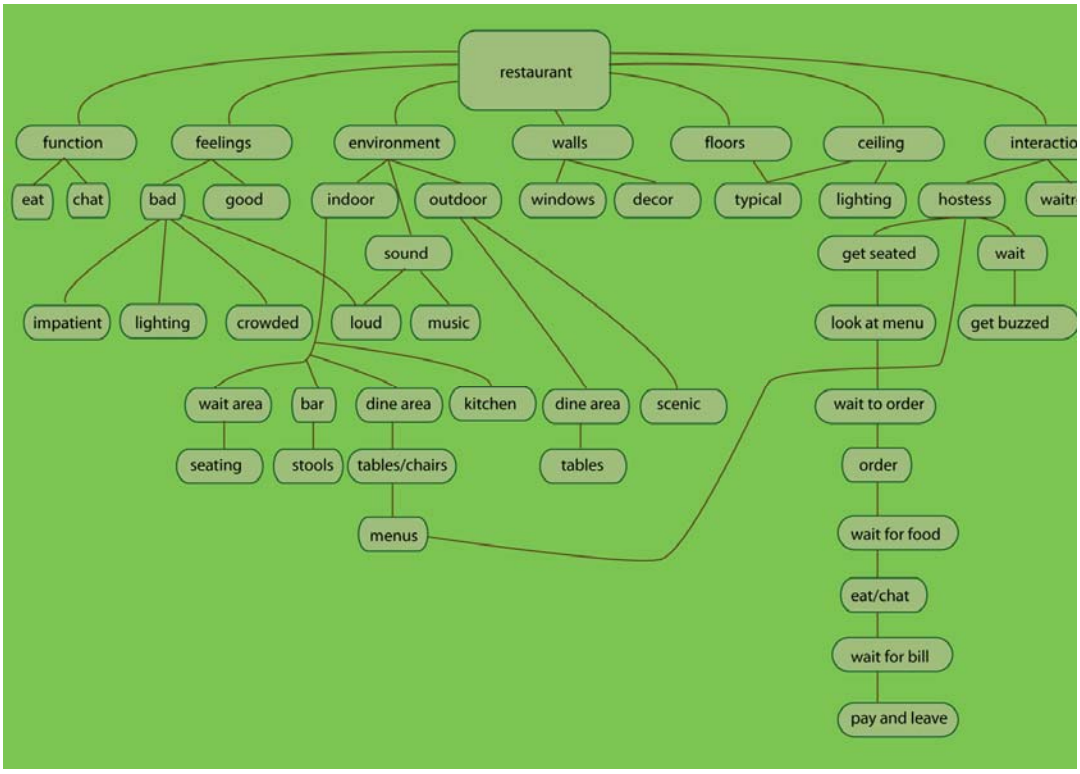

FIGURE 3: Taxonomy of a Restaurant

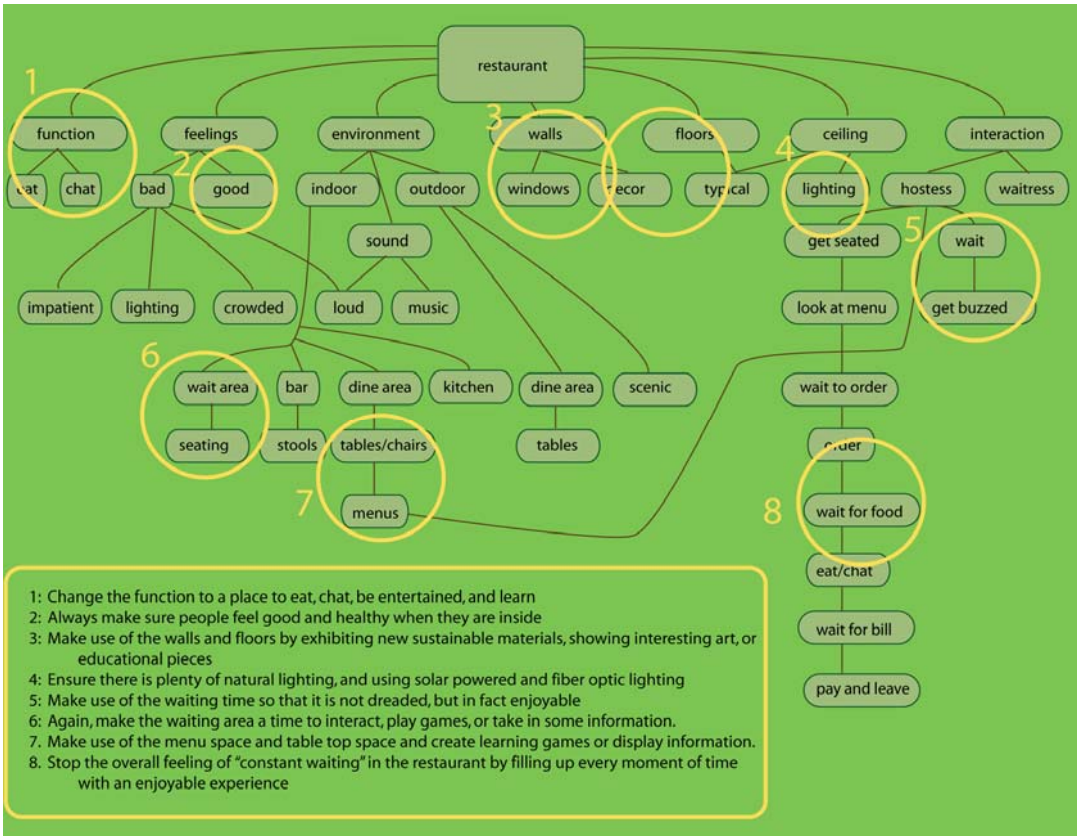

FIGURE 4: Taxonomy of a Restaurant with Areas for Improvement

2.1.8 Food and Trends

According to the National Restaurant Association's 2007 Restaurant Industry Forecast people are looking for "exciting culinary experiences" (Hensley and Stensson). Popular trends help to add that extra excitement people are so desperate for. Among the hottest menu trends this year are locally grown produce, organic produce, and free-range meat (Hensley and Stensson). In addition, research reveals that "organic items are growing in popularity across the board at table service restaurants" as well as locally produced food (Hensley and Stensson). It has been two years and these wants have not changed.

Some trends of 2009 are “comfort food reinvented,” fresher food, and storytelling (foodproductdesign.com). In addition, according to restaurant.org, people want healthier options and more for their money. “Forty-five percent of adults say restaurants are an essential part of their lifestyle,” so keeping up with the trends will keep these patrons happy (restaurant.org).

When it comes to beverages, wine is becoming increasingly popular (Hensley and Stensson). It is so popular in fact, that in the U.S. will represent the largest consumers of wine in the world by the end of the decade (Mississippi Business Journal). The popularity of wine has also merged with the green movement, and now organic wines are readily available. “U.S. sales of wines made with organic grapes reached $80 million in 2005, a 28 percent increase over the previous year” (Southwest News-Herald) and is supposed to increase by 17% by the end of 2008. American Culinary Federation members have ranked micro-distilled/artisan liquor, culinary cocktails, and organic win in the top 20 trends of this year (restaurant.org).

The food should not be the only thing that is exciting during a restaurant experience. When people come in, “they should find it unique – their experience starts immediately” (Hamaker). “Restaurateurs and designers agree that design trends for the 21st century include a more natural look and exhibition kitchens” (Hamaker). There has been a lot of use of natural tones and fabrics to create warmer, intimate environments as well (Hamaker). “Color can enhance or detract from the dining experience” (Hamaker). Studies have shown that pale yellows to deep reds, browns, russets, and purples are more appealing in a dining area, and can even make people feel more comfortable (Hamaker). “The thrust is going back to human, organic, ergonomic feelings (Spector).

In a 1995 survey conducted by the National Restaurant Association, 44% of people indicated that they wanted stimulating and active restaurant environments rather than the typical predictable. The key to success is having "…a whole concept, a total package where the exterior, the interior, the food, everything works together (Ursin).

There are endless ways to set up the restaurant's dining area. Café Periwinkle had a unique approach which consisted of "six separate dining rooms, each with its own theme and décor" (Hamaker). However the restaurant ends up looking, the goal is to make the experience become "more than just a good meal" (Hamaker). The environment should "get inside the minds of the attendees and [trigger] the right feelings (Pastrel). It is not just about fulfilling physical needs anymore, it comes down to fulfilling the psychological and emotional needs of consumers too (Pastrel).

2.2 Organic Food Facts

In the past decade, organic products have increased 20% and there is a reason why (downtoearth.org). "Organic farming delivers the highest quality, best-tasting food, produced without artificial or genetic modification and with respect for animal welfare and the environment" (downtoearth.org). Organic produce also does not include GMOs (downtoearth.org). Finally, check for the USDA organic seal to be sure it is government certified organic (treehugger.com).

Organic foods may cost a little bit more, but the benefits are outstanding. A US study showed that "organic crops had higher average levels of all 21 nutrients analyzed," some of which were Vitamin C, magnesium, iron, and phosphorus (downtoearth.org). Conventionally farming methods use about 300 different pesticides that are potentially harmful to humans and to the land (downtoearth.org). In addition, harmful additives have

been linked to many reactions and disorders in children and adults (downtoearth.org). One frightening fact is that “50 to 93 percent of pesticide residues remained on potatoes, apples and broccoli after washing” (downtoeath.org). Pesticides can cause malignant or benign tumors in animals or humans. Some of the foods that are most contaminated are raspberries, strawberries, apples, and peaches that are grown in the U.S. (gurl.com). Some other benefits of organic farming are that it saves energy, money, and sustains wildlife (downtoearth.org). In the end, when people purchase organic products, they “are making an investment in the future, too” (downtoearth.org).

2.3 Marketing: People and Business

> Sustainability must be visible in all aspects of the operation, including utilities, waste handling, maintenance, retail operations, and visitor services. The development should share sustainable design, maintenance and operational problems, and solutions with visitors, and actively demonstrate solutions and new technology. Through information signs and brochures and items sold in shops, the visitor can become informed about environmentally responsible design, operational procedures, materials, and equipment. They can learn how to adapt some of the methods to their personal lifestyles. (NPS.gov)

Applying “green” systems and policies does not necessarily mean higher costs. “Some environmental choices may be more expensive initially, but will often pay for themselves through reduced disposal costs” (Jefferson County Waste Management District). In addition, green buildings “deliver increased operating efficiencies and a

quicker return on investment" (Bonda and Sosnowchik 11). All of these things add up to a healthier, happier place and people will be positively affected by it.

It has also been proven that "new technologies [for green buildings] enhance health and well-being (Bonda and Sosnowchik 212). It is scary to think that the Environmental Protection Agency "ranked indoor air pollution as one of the top five environmental threats to public health and one of the largest remaining health risks in the United States" (Bonda and Sosnowchik 151). It has been assumed that about 40 percent of people suffer from one or more symptoms a week from unhealthy buildings (Bonda and Sosnowchik 151). With a greener atmosphere, employees and customers both will feel and appreciate the change.

Finally, if the business is taking part in positive efforts, "let customers know about the successful waste reduction and recycling program" or any other economical aspects of the restaurant (Jefferson County Waste Management District). Let them feel free to ask questions about the solar panels or energy star appliances incorporated in the environment. There is no harm in letting everyone know what positive things are going on; it is surprising how many people will value what is being done. Who can complain about a healthier, cleaner place?

2.4 Education & Architecture

> From where you are now, do you know where north is? Do you know from which direction prevailing winds originate? Do you know which spring wildflower is consistently among the first to bloom here? Where the boundaries of your regional watershed are? Where does your garbage

> go? If you don't know the answers to most of these questions, then maybe it's time to increase your ecological literacy. (Treehugger.com)

How can people increase their ecological literacy? The actual architecture of the building should be lesson one in the educational experience of the restaurant. Everyone who walks in should, in time, find out what materials were used in its construction, where they originated, and where the materials will eventually be discarded. David Orr asks, "Is it possible to design buildings … in ways that promote ecological competence and mindfulness?" (129). He asks if "through better design, is it possible to teach our students that our problems are solvable and that we are connected to the larger community of life?" (129). Ways to achieve this are to expose certain systems and technologies so that they can be seen to the public, have explanations of heating and cooling systems, and diagrams of other interesting elements. "The actual building design should say to our students what we would like them someday to say to the world" (Orr 140). "The building should be designed to make the curriculum hidden in architecture and operations part of the formal curriculum" (Orr 141).

According to NPS.gov, the following are some objections that sustainable building design must seek to achieve:

- use the building (or nonbuilding) as an educational tool to demonstrate the importance of the environment in sustaining human life
- reconnect humans with their environment for the spiritual, emotional, and therapeutic benefits that nature provides
- promote new human values and lifestyles to achieve a more harmonious relationship with local, regional, and global resources and environments
- increase public awareness about appropriate technologies and the cradle-to-grave energy and waste implications of various building and consumer materials
- nurture living cultures to perpetuate indigenous responsiveness to, and harmony with, local environmental factors

- relay cultural and historical understandings of the site with local, regional, and global relationships

The building is just as important as what is inside of it. One cannot promote a sustainable restaurant with organic food and reclaimed materials and have a wasteful building. A new and unique approach to sustainable architecture is going through a prefab company. There are many companies out there like Jot House, Jeriko House, Flat Pak House, and Piece Homes. Each is different in approach but successful in creating sustainable, unique buildings. Why choose prefab over conventional building methods? According to Modern-Modular.com, the quality of the build is much higher because factory workers are able to automate parts creating multiple, identical pieces quickly. These parts are also structurally superior to their competitors. Because they are created in the factory, they are more cost efficient, require less labor, have less chance for theft, fewer mistakes are made, less waste is produced and less traveling is required. These houses go up much more quickly that built homes, and they are federal certified green homes and energy start compliant.

There are a lot of companies that provide pre-fab with different things to offer. Piece Homes incorporates green roofs and solar panels into their designs, while Flat Pak House allows people to totally customize the building. No matter if it is prefab or built by hand, the building should "influence how we think and how we think about thinking (Orr 137).

2.5 Feng Shui

Another way to influence how people feel inside a building is to incorporate the principles of Feng Shui. Feng Shui is the Chinese art of placing. It literally means wind

and water (Collins 1). According to this strategy, buildings are not static, but dynamic and living things that should not harm its inhabitants but actually "support and nurture" them (Collins 9). Figure 5 is a diagram from earthangellaney.com that explains the meanings of different areas of a building.

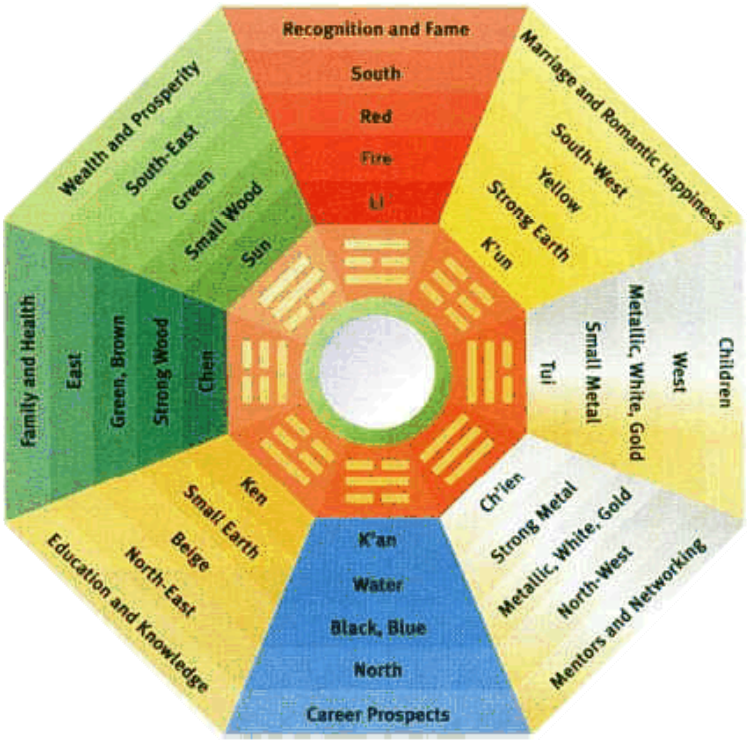

FIGURE 5: Feng Shui (earthangellaney.com)

2.6 Innovative Materials

Materials have come a long way to become more sustainable and just better in general. For flooring, Forbo has created Marmoleum linoleum that is made from readily renewable natural ingredients which have naturally occurring antistatic and antimicrobial properties (Bonda and Sosnowchik 128). Amtico International offers Stratica which is non-PVC, chlorine free tile flooring that is low maintenance. Other eco-options are

rubber, cork, concrete, limestone, and bamboo (Bonda and Sosnowchik 129-133). If carpet is being used, there are reclamation and buyback programs available through certain companies, as well as carpet that can be broken down after its use and then reassembled into carpet products that look like new (Bonda and Sosnowchik 123-124). The industry has come a long way with options that are modular, reusable, and even natural (Bonda and Sosnowchik 123-124).

New technologies in wall coverings have cut back on harmful off-gassing and landfills. A unique wall covering comes from Pallas Textiles which consists of 50 to 70 percent recycled Japanese telephone book paper (Bonda and Sosnowchik 140). Another innovative product is 180 Walls, a self-adhesive wall covering that hangs without paste, is breathable, is stain resistant and antimicrobial (Bonda and Sosnowchik 140-141). Almost most importantly, there are new lines of paint that contain zero VOCs, no-odor, and are very durable (Bonda and Sosnowchik 141).

A number of interesting surfacing options are available on the market. 3form has a resin system engineered by "encapsulating textured, colored, and natural inner layers within high performance polymer skins to create vibrant translucent panels" (Bonda and Sosnowchik 143). It is made of 100% ecoresin, is lightweight, and is recyclable (Bonda and Sosnowchik 143). Kirei board is an eco-friendly substitute for wood and is made from reclaimed agricultural fiber (Kirei USA). Another incredible surfacing material is Sileston Quartz whose features include being stain-resistant, scratch-resistant, scorch-resistant, durable, non-porous, and available with Microban, an anti-microbial protection (silestoneusa.com). Not only are all these products good for the environment, but they

are also all really beautiful. This is important to keep the aesthetic eye of customers pleased and attract them to these materials that are not commonly used or known about.

Finally, a unique product from MechoShade Systems is EcoVeil solar shade. The cloth can be recycled back into a new shade at the end of its useful life in a continuous cradle to cradle cycle (Bonda and Sosnowchik 145). Some of its other advantages are durability, light weight, washable, UV-resistant, flame-retardant, and antimicrobial. All of these traits are extremely important when it comes to textiles in a restaurant.

For furniture, a renewable wheat straw fiber called WoodStalk can be used where wood is traditionally used (Bonda and Sosnowchik 137). There are also lines of furniture that "contain 20 and 30 percent recycled-content steel, between 70 and 100 percent recycled-content aluminum, and 100 percent recycled-content particleboard…" (Bonda and Sosnowchik 136). Hemp and wheat board are two other environmentally friendly materials that can be used for anything from draperies to countertops. When purchasing furniture, some things to pay attention to are whether it uses natural latex foam or postindustrial foam, organic or economically sound textiles, and nontoxic glues (Bonda and Sosnowchik 139). All of these eco-friendly choices have positive affects on the health of people within the building and on the environment. In addition, by having these materials displayed customers may inquire about them, learn about them, and spread the word about them.

2.7 Case Studies

2.7.1. Existing Green Restaurant

Habana Outpost is a green restaurant owned and operated in New York City. This restaurant is special because it is the first in New York City to be solar powered. It

incorporates many impressive green aspects like repurposed boat sails, recycled rainwater, composted scraps, use of local and organic foods, and even a bicycle powered blender!

A conversation with the creator of this restaurant led to some useful insights on how green restaurants can work, and tips to get people involved. Some excerpts from the discussion are below.

Erin: **How have people responded to your restaurant?**

Owner: Amazingly well,

Basis: less tree hugger and more people oriented

Some people go in because there's a lot of art, people there, or food

It is a restaurant first

E: **Does it make them curious about sustainability/green practices?**

Enthusiastic

Absolutely has changed some peoples attitudes

Solar panels are outside, and can be seen

Architects bring clients to look at them

E: **What are ways to educate people, what do you do?**

Kids corner – activities

Lady bug release

Warm compost seminar

Coloring book out of recycled paper

Pictographs on how solar energy works

Pictures

Placemats with a treasure hunt

Captive audience in subtle ways

Make them ask you…

Visual, take it or leave

Hands on

2.8 Experience Design

Great experiences do not happen accidentally, they are planned and deliberate. According to Nathan Shedroff, a pioneer in experience design, there are, at least, six dimensions to experiences: Time/Duration, Interactivity, Intensity, Breadth/Consistency, Sensorial and Cognitive Triggers, and Significance/Meaning. (Figure 6) By using these dimensions, one can successfully design a meaningful and effective experience (Nathan.com).

FIGURE 6: Meaningful Experience Design (Nathan.com)

2.9 Conclusions

In conclusion, the total restaurant experience must incorporate strict interior requirements, energy smart equipment and technological choices, smart, healthy, and delicious food and drinks, sustainable materials, and an overall balance of the theme. All of this research supports the argument of the study and the position that the restaurant should be a "total experience environment" that creates "meaningful connections with customers" (Spector). The product will be an approach to design a successful merging of an economically booming business with stimulating education for the future resulting in a happier, healthier, and more aware society. According to consumers' increasing demands for restaurants and the competition's struggle to keep them intrigued, the window of opportunity for this type of restaurant is open and awaiting. As long as the designer can meet the needs of the stakeholders, a design will succeed on many levels (Okala) (Figure 7).

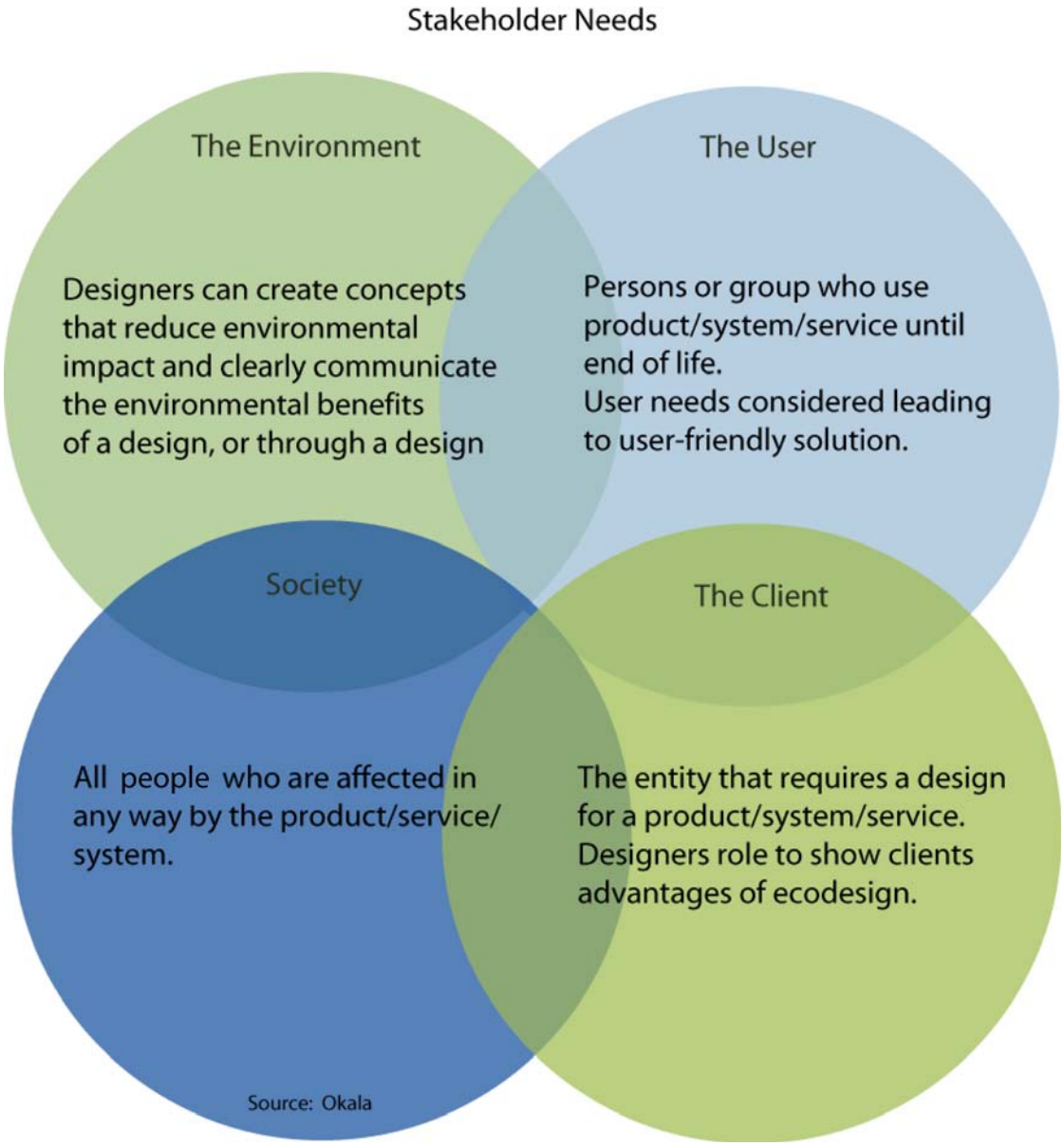

FIGURE 7: Stakeholders Needs (Okala)

CHAPTER 3: DEVELOPMENT OF APPROACH

3.1 Introduction

This approach is a design process to create an educational and stimulating green restaurant inside and out. While the approach can apply to new construction or existing buildings, this project will mostly focus on new builds. Brand new buildings can be built using sustainable practices and materials, thus becoming more energy efficient and healthier. Within the approach it will be described how to choose and research a theme, how to communicate the theme, how to meet the needs of the consumers by incorporating triggers, symbols, and concepts, and finally how to apply interaction within the environment.

Regardless of the theme or type of restaurant, this approach can help inspire restaurateurs to have a smaller footprint, compost food scraps, recycle materials, and create a healthier happier atmosphere. These practices are appreciated by customers and employees alike.

This approach is not intended to be holistic. Each step is addressed individually, allowing bits and pieces to be incorporated into projects based upon the restaurateur's wants, needs, and budget.

3.2 Exterior

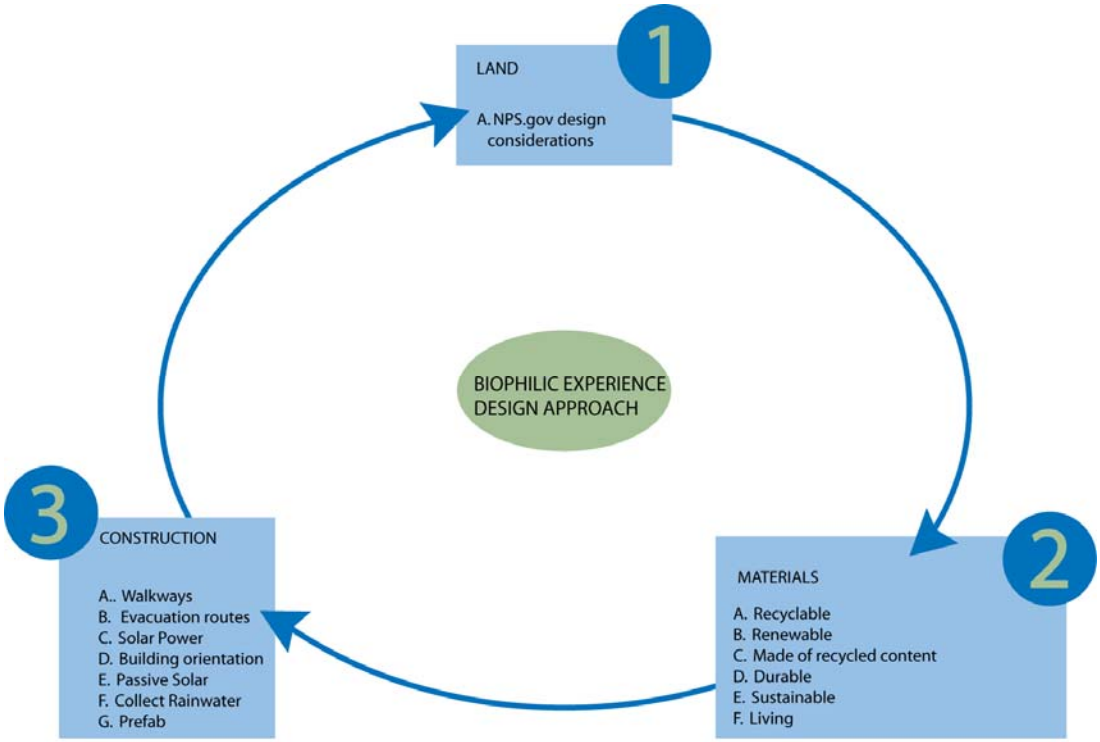

FIGURE 8: Biophilic Experience Design Approach - Exterior

The exterior elements of the restaurant are just as important as what is going on inside. How the land, the materials, and the construction of the building are handled will be the first things customers will notice and will set the tone for the entire experience.

It is important to use materials that are recyclable, made from recycled content, durable, and sustainable. There are even such things as living walls (Figure 9).

FIGURE 9: Living Wall (Greenstrides.com)

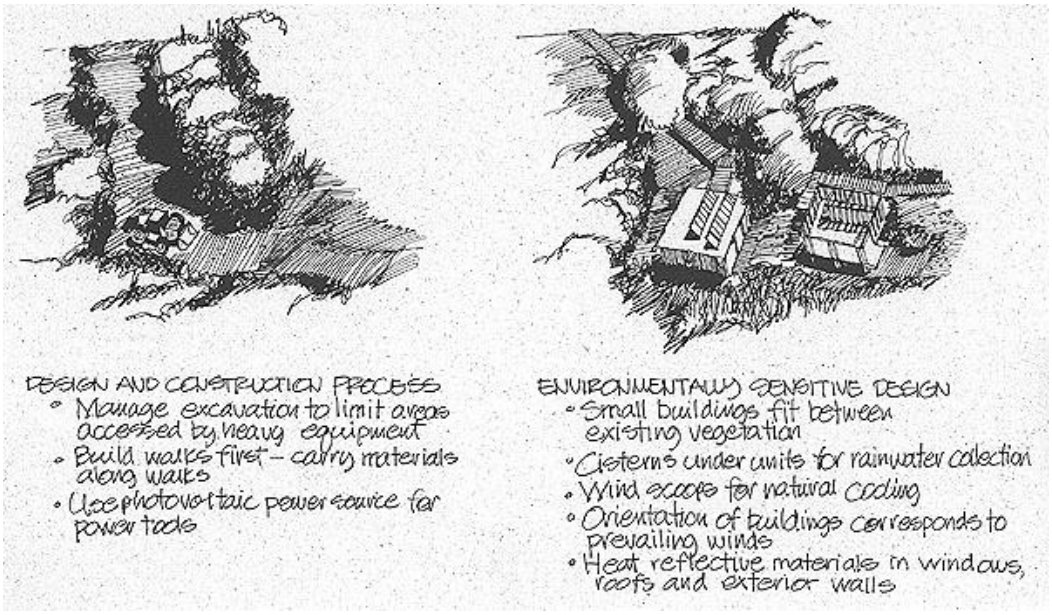

FIGURE 10: Land Management (NPS.gov)

3.2.1 The Land

The following are general site design considerations for sustainable building from the website NPS.gov:

- Promote spiritual harmony with, and embody an ethical responsibility to, the native landscape and its resources.
- Plan landscape development according to the surrounding context rather than by overlaying familiar patterns and solutions.
- Do not sacrifice ecological integrity or economic viability in a sustainable development; both are equally important factors in the development process.
- Understand the site as an integrated ecosystem with changes occurring over time in dynamic balance; the impacts of development must be confined within these natural changes.
- Allow simplicity of functions to prevail, while respecting basic human needs of comfort and safety.
- Recognize there is no such thing as waste, only resources out of place.
- Assess feasibility of development in long-term social and environmental costs, not just short-term construction costs.
- Analyze and model water and nutrient cycles prior to development intervention - "First, do no harm."
- Minimize areas of vegetation disturbance, earth grading, and water channel alternation.
- Locate structures to take maximum advantage of passive energy technologies to provide for human comfort.
- Provide space for processing all wastes created onsite (collection/recycling facilities, digesters, lagoons, etc.) so that no hazardous or destructive wastes will be released into the environment.
- Determine environmentally safe means of onsite energy production and storage in the early stages of site planning.
- Phase development to allow for the monitoring of cumulative environmental impacts of development.
- Allow the natural ecosystem to be self-maintaining to the greatest extent possible.
- Develop facilities to integrate selected maintenance functions such as energy conservation, waste reduction, recycling, and resource conservation into the visitor experience.
- Incorporate indigenous materials and crafts into structures, native plants into landscaping, and local customs into programs and operations (NPS.gov).

FIGURE 11: Piece Home (piecehomes.com)

3.2.2 Prefab Buildings

If a new building is being considered, pre-fabricated houses are a smart move. Most of them are already green certified buildings, they go up quickly, and little mess is made. These buildings will save a lot money in the long run. There are tons of companies that offer custom built solutions, some are: Logical Homes, Marmol Radziner Prefab, EcoSteel, Flat Pak House, Jot House, Jeriko House, and Piece Homes (Figure 10).

3.2.3 Orientation and Passive Solar

If the decision is made to build a restaurant or use a prefabricated option, then building orientation is something that will have to be taken into consideration. In order to take advantage of the sun, the building must be oriented correctly (Figure 12). The longer sides of the building should face north and south and should have plenty of windows, while the short sides should face east and west and should not have many

windows to keep direct sunlight out (Greenbuilder.com). During the warmer season, the building's south side should only receive light from nine A.M. to three P.M. (Greenbuilder.com). Finally, the spaces that need the most light, heating, and cooling should face the south, and less used spaces should face north (Greenbuilder.com).

If the building already exists and is not oriented properly there are still some things that can be done to control the sun. Glazed windows can block out large percentages of UV light and save on energy costs, UV blocking films can be added to the windows for a more cost efficient solution, and solar screens can be installed outside of the building.

Whichever route is taken, incorporating natural lighting is extremely important. It has a positive psychological impact on people, boosts mood, and relieves stress (Educause). In 1999, the Heschong Mahone Group studied 2,000 classrooms and found that students were learning faster and producing higher scores in day lit rooms, verses rooms without daylight. The teachers benefited as well (Educause).

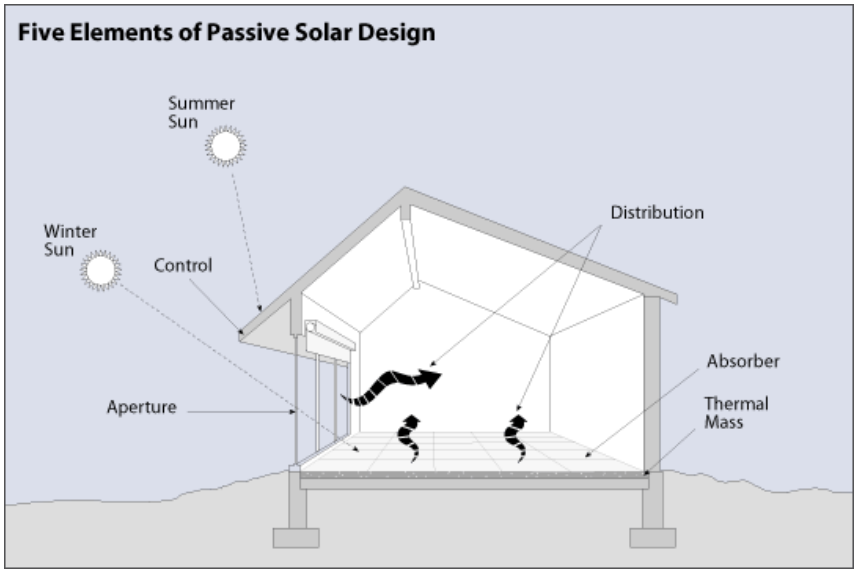

FIGURE 12: Five Elements of Passive Solar Design (EcoHomeResource.com)

3.3 Significance and Theme

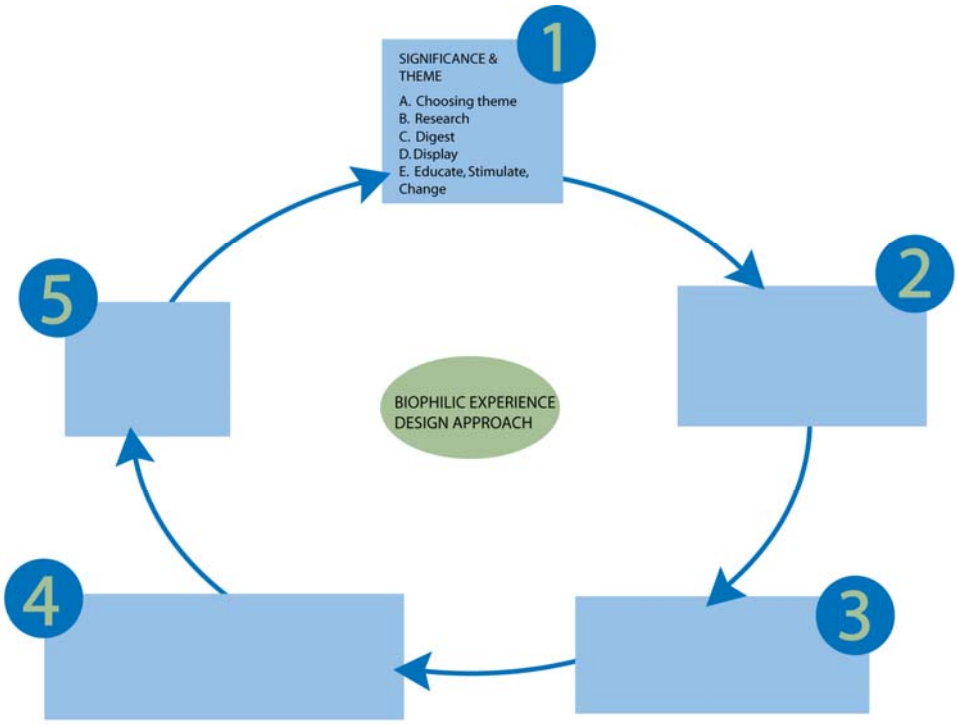

FIGURE 13: Biophilic Experience Design Approach – Step 1

The significance of the restaurant is to provide a meaningful experience that offers information to customers, which will stay with them, get passed on, and eventually, help to make a difference in an area and in people's life choices. It is also a place that boosts mood, health, and attitude. "Environments that produce positive emotional states can be expected to facilitate learning and the development of place attachment" (Educause).

The type of meaningful experience portrayed is up to the restaurateur. That is where choosing a theme comes into play. Some examples of themes are: Green systems, solar power, trees and plants, water conservation, recycling, sustainability, nature and animals, etc.

3.3.1 Step 1: Choosing a theme. This will prove to be one of the tougher decisions that will have to be made. The theme will affect every other design decision made. It will also keep the design controlled and keep the space cohesive. The theme should consist of something that the restaurateur is already knowledgeable about or passionate about, whether it is reclaimed furniture and materials, fresh and local food, or the arts.

At this point in the design process there should be a pretty good idea of what the consumers' needs are and what type of experience to portray. Think about what problems are abundant in the surrounding area. Is it historically significant? Was the land previously used for agriculture? Was it a forest? Are people in the area not aware of the benefits of recycling or the nutritional value in organic food? Is there an interest in alternative energy or water conservation?

Once a route is decided upon, it is time to explore all aspects of the theme.

3.3.2 Step 2: Research. Dive deep into the theme and find out everything possible. This can be done through the internet, the library, magazines or even city hall. Within the research note finding like: facts and figures, concept explanations, systems, pictures, artwork, shocking and surprising information. Start a binder with tab dividers and file all findings by subject. Cut out and print pictures to create a section for inspiration.

3.3.3 Step 3: Digest. Once all the information has been collected, filter out unique, interesting, and intriguing information. Numerical statistics are always powerful as well as information that can be displayed visually. To keep the space from feeling like a museum, pick out information that will delight, amuse, or even shock (Kellert). It will be this type of information that people will grasp on to, remember, and carry on (Educause). "Mystery and surprise stimulate the human mind and senses and invite discovery"

(Educause). Focus on finding information that can be represented visually for ease of learning.

3.3.4 Step 4: Display. According to SelfGrowth.com, about 65% of people are visual learners, meaning they learn by seeing charts, graphs, and pictures (Riklan). It is important to appeal to this mass group and make use of every surface and area possible to depict information visually. Try to incorporate changeable focal points, mobile displays, and diversity in the way information is communicated to keep up interest. According to a recent survey, people were so desperate for something to do at restaurants that they read condiment bottles, fiddled with wrappers and napkins, and stared at the walls. Those areas in the restaurant can be taken advantage of, and can actually give people something meaningful to read, fiddle with, and look at.

Learning from this space will go beyond reading and seeing information, to experiencing it as well. The air will smell clean and non-toxic, and patrons will find it is because of the cross-ventilation and air purifying plants. The space will feel comforting, and patrons will learn it is because of open views to nature and nature inspired design (Kellert). "Environments that simulate nature provide a sense of serenity and pleasure" (Educause).

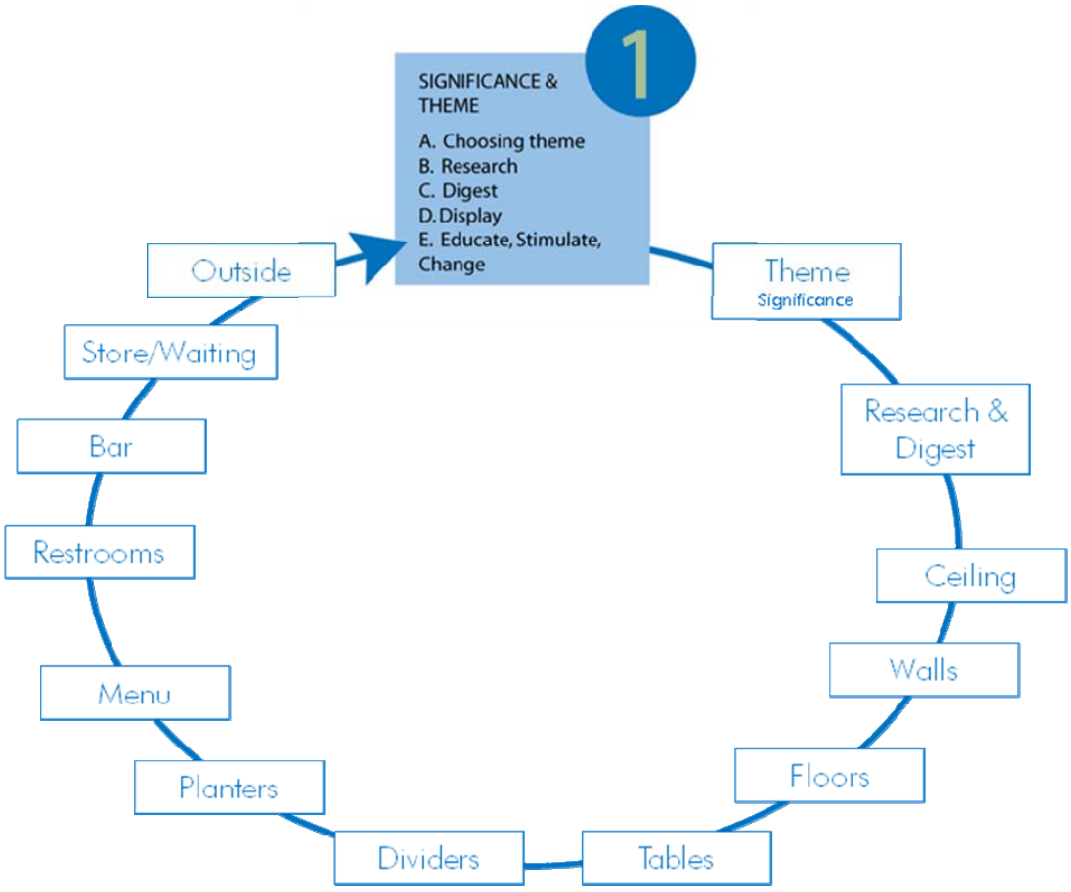

FIGURE 14: Key Display Areas

The following is a list of key areas to take advantage of when designing the restaurant and displaying information:

*Ceiling***:** Varied heights can resemble a canopy and represent safety and comfort (Educause). Lights can mimic the light of the sun. They can be covered in recycled elements or an eco-friendly tile. Branchlike forms can float overhead (Kellen).

Walls: Display of local or famous art and photography, statistics, names of trees, plants and leaves, visuals that go along with the theme, eco-friendly textiles, water features, a fireplace.

Floors: show eco-friendly flooring options like cork, linoleum, and recycled glass. Have a water feature or informative trail. “Meandering halls can mimic nature’s patterns” (Educause).

Tables: Table tops are going to be a central area for display. It is the region where the most time is spent, and hands-on activities can be incorporated. It can go as far as being a technological interface, or be as simple as a surface that can be drawn on and interacted with. The table is a place where more in depth reading can take place.

Menu: Use eco-friendly material. Put information on organic foods or tell where the food came from. Pictures of food or local farms. Nutritional information. The menu can change to become seasonal with fruits and vegetables.

Restrooms: The restrooms are places that are often neglected when it comes to design. It is a unique spot that can be designed smartly and also be the host of more gritty information. It is also a place where more time is spent than we think. “The average woman takes 8 to 10 minutes on a trip to the bathroom [while] men take an average of 4 minutes (Baraban and Durocher 130). The back of stall doors can have statistics about water usage and visuals. The toilet paper can have information printed onto it, or can explain that it is made from recycled materials. People can learn about the low-flow or composting toilets that are there.

Bar: The bar is an area where people can interact and learn that there are organic options when it comes to wine, liquor, or beer. People can sample local brews or wines as well. The bar top can house plants, information, or visuals.

Store/Wait area: “Merchandising opportunities in the waiting area are unlimited” (Baraban and Durocher, 95). The store is an important area of the restaurant. It will

greet patrons as they enter and also see them out when they leave. It is where compost, books, herbs and other things can be sold. It is also where people can inquire about certain textiles, materials, and systems that are used within the restaurant. The store takes the restaurant to the next level when it comes to gathering real information and taking home real knowledge.

Outside: "Nature continually stimulates us because of its always changing elements" (Educause). The outdoor area is a place to take in nature and feel relaxed. It is first hand experience of the environment and does not need much to persuade. There can be hanging planters with herbs or flowers growing. There can be walking trails or lakes that can be admired.

3.3.5 Step 5: Educate, Stimulate, Change. This is the absolute main objective of the entire project. All the effort put into the design, theme, and restaurant comes down to whether people are carrying information and new attitudes out the door when they leave.

3.4 Intensity

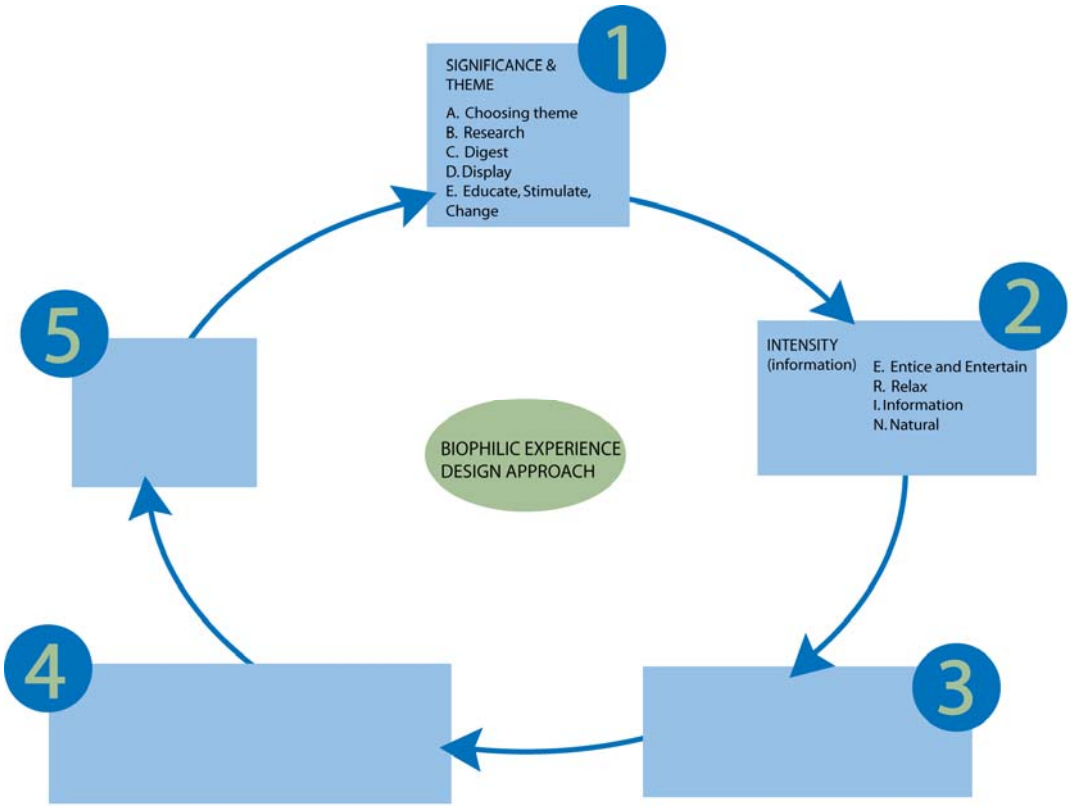

FIGURE 15: Biophilic Experience Design Approach - Step 2

Intensity of the theme and overall experience is very important. There is a fine line between forcing knowledge and simply offering it. The thing that will keep the restaurant and approach successful is the way it is portrayed and how it connects with the consumers. Remember, it is a restaurant first, not a seminar or classroom. Here is a trick to keep the environment as lighthearted and entertaining as it should be; just remember this name: ERIN - Entice & Entertain. Relax, Information, and Natural.

Figure 16: E.R.I.N Approach

3.4.1 E: Entice & Entertain children and adults. Delight and surprise people with designs that come from nature, a striking water feature, or tasty herbs growing from the walls. Have fun games around the restaurant or trivia to test knowledge. Incorporate an element of surprise that will hang in people's minds even after they leave.

3.4.2 R: Relax; the environment should make patrons at ease. It is not a theme park or gimmicky show. Guests should feel comfortable whether they are there eager to learn or just hungry! With all the healthy design decisions, people will not be able to help but feel good in the space.

3.4.3 I: Information is there**,** take it or leave it. According to New York Restaurateur Sean Meenan, our job is to offer the information and put it out there. Then it is up to the customer whether they want to get involved with the games, read the walls, or shop the store.

3.4.4 N: Natural elements should surround patrons, literally and symbolically. Everything should tell a story about where it came from, how it is better, and how it is beautiful. From views to the outside to biophilically designed interiors, people should feel connected with the environment (Kellert).

3.5 Triggers

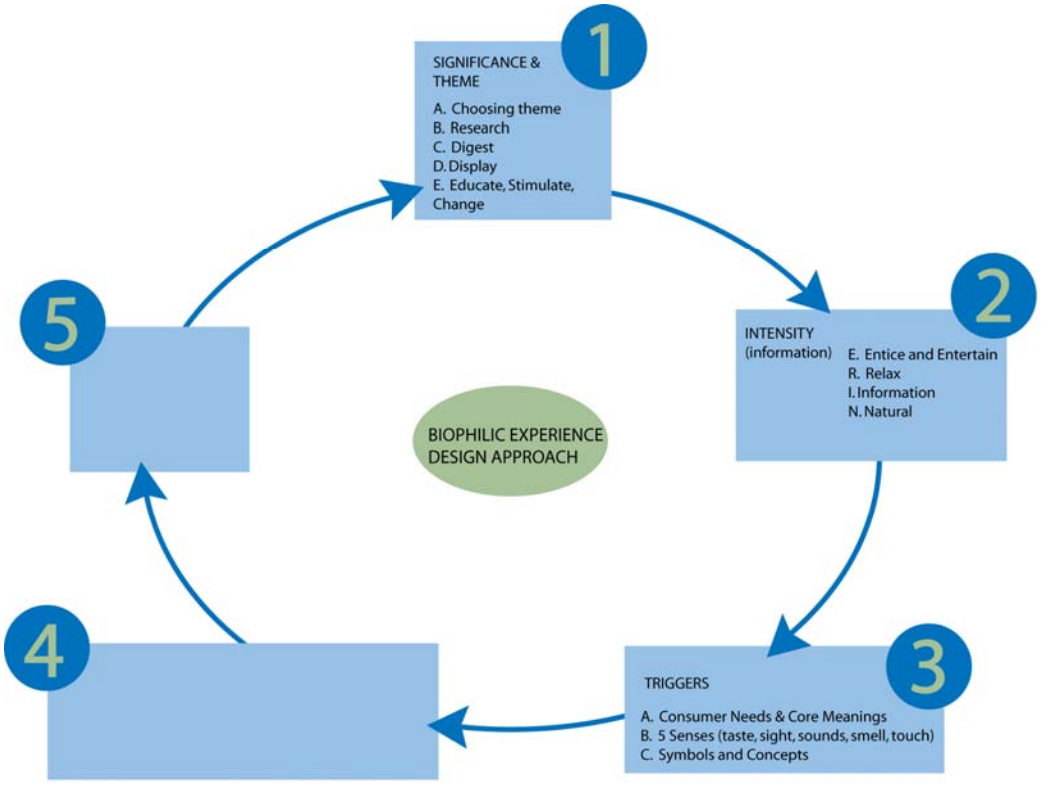

FIGURE 17: Biophilic Experience Design Approach - Step 3

The triggers are what bring the experience to life. They consist of everything patrons see, hear, smell, touch, and taste. They are the concepts patrons learn and the symbols they grow to recognize. They are what satisfy the consumer's needs and touch their core meanings. The triggers are what make a meaningful experience and what bring the theme to life (Nathan.com).

3.5.1 Consumer Needs: The consumers need comfort, soothing lighting, a connection to nature, and a healthy, multi-sensory environment. Most have a thirst for knowledge and a healthy hunger. It is a must to fulfill the consumers' needs through triggers.

3.5.2 Stimulating the 5 Senses:

"Stimulating places attract people and spark creative thinking" (Educause). They also have the "ability to motivate and engage" people (Educause). A diversity in stimulation "raises mental awareness and allows people to absorb the information and ideas" that are provided (Educause).

Sight: Availability of books and magazines, views of outdoors and natural lighting, natural colors, textures, patterns, organic shapes (Kellert), table top information, menus, art, new materials, facts and figures, symbols and concepts, water, plants, wildlife, views of other tables and people, television, updating imagery, projections

Sound: Nature, buffered noise from vegetation (nps.gov), conversation, music, television, open kitchen

Touch: Herbs, textiles, flooring, materials

Taste: Local cuisine (nps.gov), organic food, organic wine/beer, fresh herbs

Smell: Clean air, fresh breeze, plants, flowers, herbs, cooking food

3.5.3 Symbols and Concepts

Depending on the theme, there are a lot of opportunities to represent symbols and concepts throughout the design. For example, the concept of recycling (Figure 18) and the symbols that represent different materials, the concept of composting food scraps and creating compost (Figure 19), and the concept of buying local or organic and the symbols that represent these. In addition there are more complicated concepts that are truly incredible such as solar power, reclaiming rainwater, grey water systems and green roofs. Show these systems at work whenever possible, post diagrams, and explain the benefits.

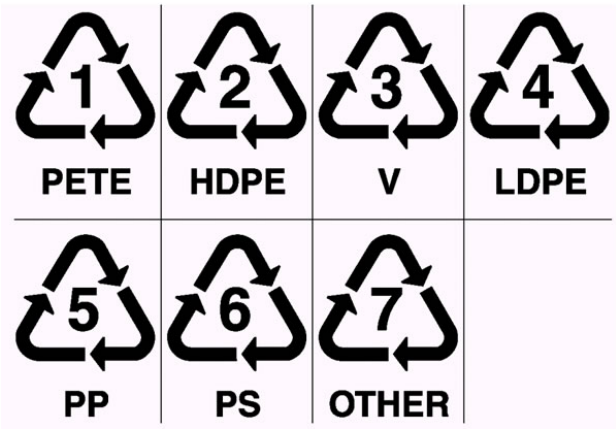

FIGURE 18: Recycling Symbols (crossplastics.com)

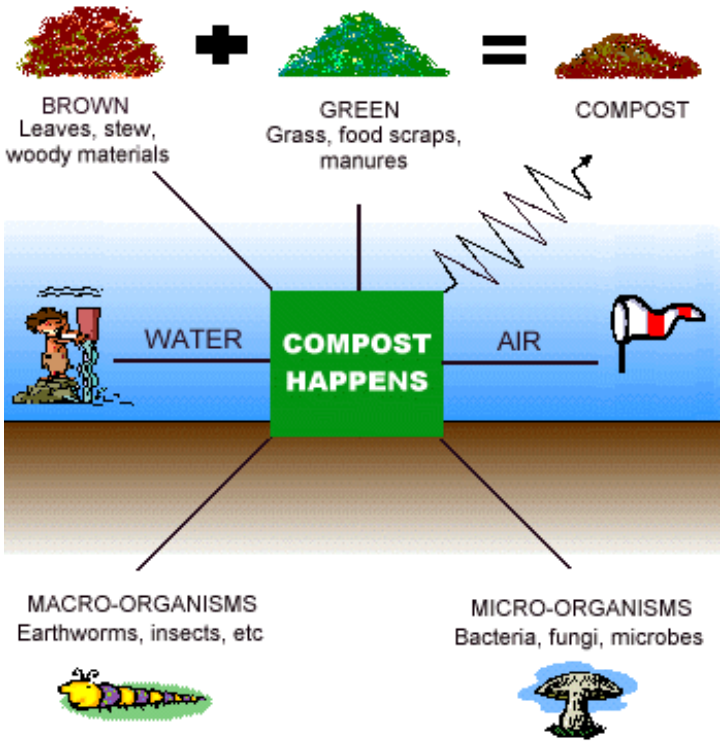

FIGURE 19: Compost Diagram (www.torfaen.gov.uk)

3.6 Interaction & Interpretation

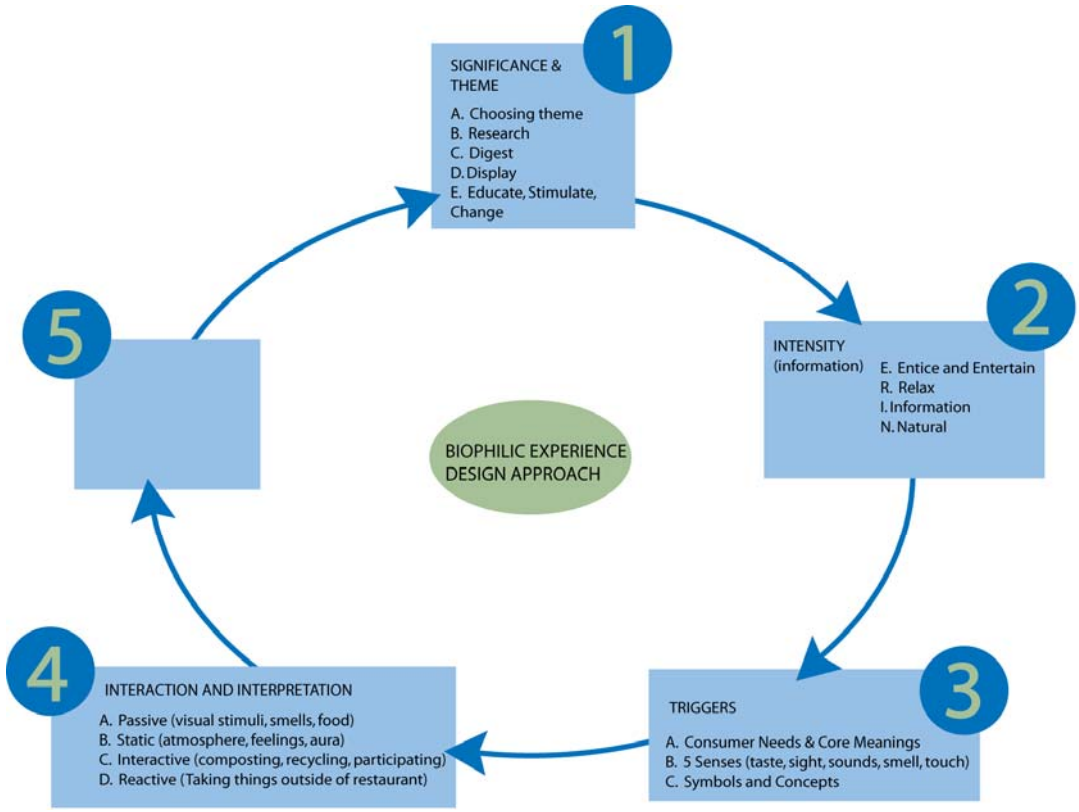

FIGURE 20: Biophilic Experience Design Approach - Step 4

"Interpretation is an educational activity that reveals meanings and relationships through the use of original objects, first-hand experiences, and illustrative media. It is more than simply to communicate facts" (nps.gov).

FIGURE 21: Passive, Static, Interactive, Reactive

3.6.1 Passive interaction involves the things patrons see, smell, and hear because they have eyes, noses, and ears (Nathan.com). It is a natural effect of being a person and requires little to no energy. According to Baraban and Durocher, these are distance receptors, and they "examine faraway objects and sensations" (60). It is because of this passive interaction and these receptors, though, that the things that people see and smell must be pleasant, or more than that, amazing. Once the passive interaction is processed, it should be interpreted in a positive way.

3.6.2 Static interaction takes into account the atmosphere, mood, feelings and aura of the surroundings (Nathan.com). In addition, it affects the skin, membranes, and muscles, when examining things up close (Baraban and Durocher, 60). This is going to affect how people feel in a space because of the temperature, lighting, spatial arrangement of furniture, sounds, colors, etc. Movement does not even have to be made to interact this

way; it is simply an immediate response to the restaurant as a whole. A consumer should interpret the space as comfortable, clean, and relaxing.

3.6.3 Interactive responses come from connecting and participating. Tables should be able to adapt to different social settings and communities of people. This connection "lets people feel a part of something bigger" (Educause). In addition, there should be areas for refuge if customers prefer to be a little more private.

Interaction is not always about person with person, but can also be person with place or thing. Get people involved by letting them take their food scraps to a compost bin or incorporate a recycling system by the trash area. Allow people to control personal lighting with dimmers or let them pedal to turn a fan. Let them touch, feel, and smell. There are endless opportunities for interaction in this space.

The objective is to keep the senses filled and pleased with time spent interacting with others or interacting with the space. The table tops become a huge part of interacting; it is where a majority of time is spent, and where it is usually spent waiting. The table tops themselves can be comprised of a sustainable material. Then, on top can be a number of puzzles, games, and trivia questions that go along with the overall theme. There can also be articles, diagrams, and maps. These things should be able to be easily changed, transitioned, and cleaned. One way is to have a glass or eco-resin overlay on the table that sandwich the papers. Another, more technologically advanced way, is to have a totally digital surface that can be manipulated and interacted with by the customers.

Some table-top examples are:

Word search – Choose words that are directly related to the theme. Include definitions of them as well to help with "terminology disconnect."

Crossword – Choose facts that are directly related to the theme.

Articles/current events – According to theme, find information on recent breakthroughs, technological advances, new findings, etc.

Local Area – Old maps and pictures, information about the land, or stories of its history

Restaurant Quiz – Have questions regarding the restaurant surroundings, this will get people observing and learning what is around them.

Trivia – Ask trivia questions on tabletop. The waitress will hold the right answers and will expose them when the table is done. Hand held trivia games to play against others in the restaurant.

Tangram – Tangrams is a game using 7 specific polygons to fit into predefined outlines (Figures 22 and 23). The shapes themselves can be unique materials or can have information on them. The predefined outlines will be on the tabletop,

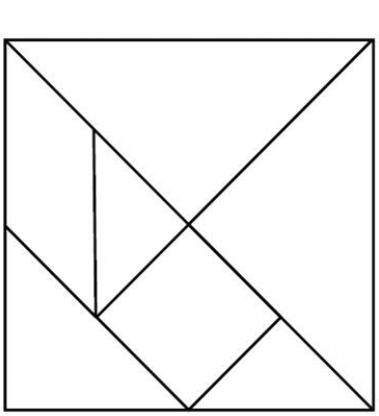

FIGURE 22: Tangram (About.com)

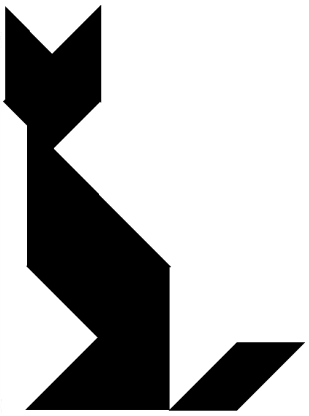

FIGURE 23: Tangram (Myweb3000.com)

Informative – Fun facts, specifics on a certain part of the theme, anything that is enjoyable and easy to read.

Some other examples are:

Learning about different herbs, picking, and eating them.

Talking with waiter.

Talking with bartender about organic drinks.

Going on walking trail while waiting for table or after meal

Walking about restaurant to read, see, and learn.

Live trivia

Reading the menu and learning about the local food/organic food/etc.

3.6.4 Reactive – In the end, this is the most important step. This refers to getting people to act outside of the restaurant. To take their curiosity to the computer and do some research, to beginning a recycling program, or to doing a better job of conserving resources. Figure out ways to get the customers involved and it will help the restaurant and the community. This strategy is a win-win situation.

Some examples are:

Having children bring in fun facts to display in restaurant. (This gets them onto the computer researching)

Have a trivia question printed on the receipt and when the receipt and answer are brought back, the customer gets something for free.

Have a day of the week when recyclables are brought in and a reward is received.

Part of proceeds donated to green organizations.

Have a community post where people can advertise events, information, etc.

CHAPTER 4: IMPLEMENTATION OF STUDY

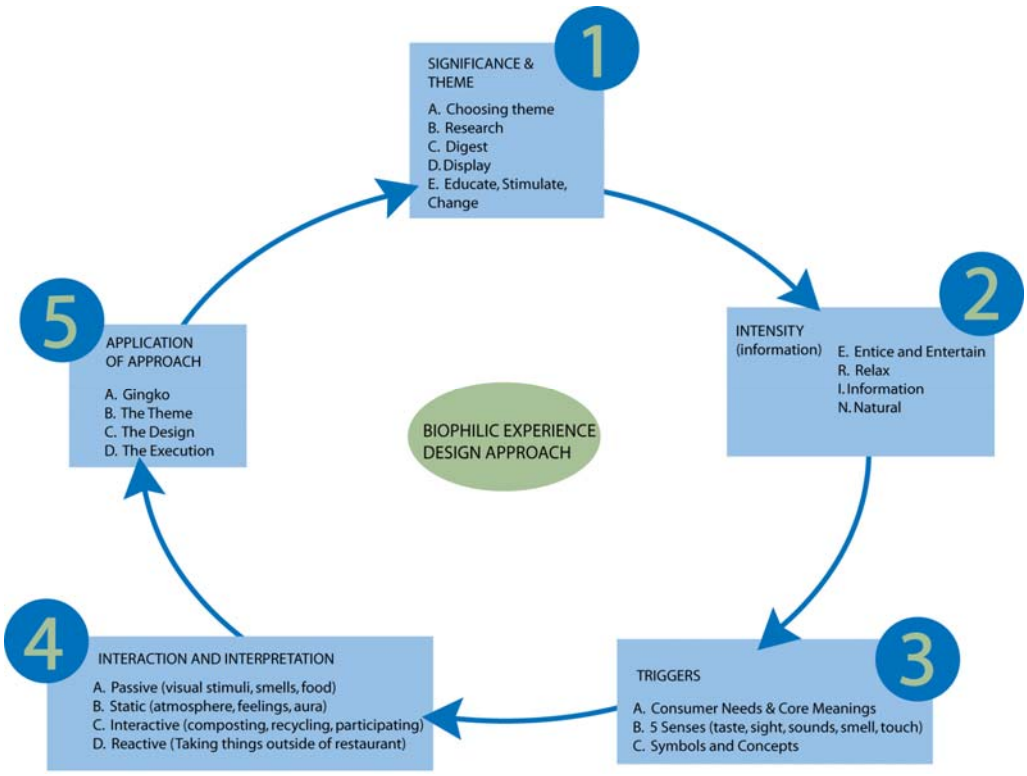

FIGURE 24: Biophilic Experience Design Approach – Step 5

4.1 Introduction - Gingko

Using the developed approach and the modified floor plan of an existing restaurant in Opelika, Alabama (Cock of the Walk), Gingko was created. Gingko will be treated as a newly constructed building on the same plot of land. This land already consists of a lake and is highly wooded. The building is oriented with the wall of windows facing south and is built out of sustainable materials.

4.2 Significance and Theme

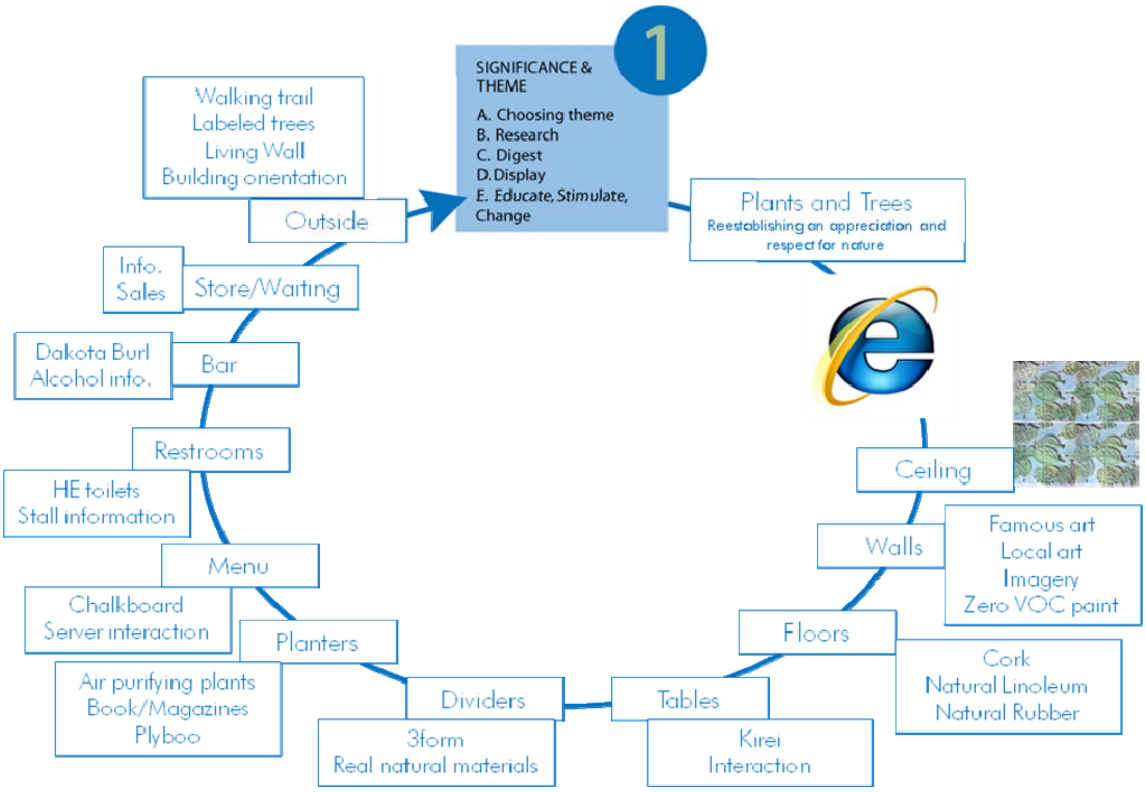

FIGURE 25: Gingko - Step 1

The significance of Gingko is to create a place to eat, learn, and live. This means it is much more than just a restaurant with great food, it is a place where patrons are filled with pride and awe of nature and what it creates. Gingko reestablishes a respect and appreciation for nature – specifically plants and trees. This admiration of the natural world should extend outside of the restaurant walls and be carried out by the people who have been inside of it – changing lives.

4.2.1 Step 1: Choosing a Theme

Plants and Trees

4.2.2 Step 2: Research

Treesaregood.com - Includes information on trees and the environment, general facts, record-setting trees, and trees and science

Savatree.com – Interesting facts and figures about trees

eHow – How to grow an herb garden indoors

About.com – Top air purifying plants

Humeseeds.com – Houseplants that purify the air

Neatorama.com - 10 most magnificent trees in the world

Fineartandhistory.com – Famous and Historical trees in America

Forestry.state.al.us - Alabama's famous and historical tree program

Nssdc.gsfc.nasa.gov – Information about the moon trees, including the 4 in Alabama

Cache.eb.com – A visual of the 8 tallest trees in the world

Wine.appellationamerica.com – Alabama wineries

About.com – Recommended organic wines

Aces.edu - A key to common trees of Alabama (completely visual)

Holistic-interior-designs.com – A guide to designing healthy and natural interiors with sustainable material list

Greenbuilder.com – A sourcebook for green and sustainable building

Foodservicewarehouse.com – Website for commercial kitchens that offers everything from green education in the kitchen to biodegradable takeout boxes.

3-form.com – Eco-resin

Greenfloors.com – Offers a lot of green flooring options along with information about them

Bettencourtwood.com – Offers a range of eco-friendly surfacing materials

AnselAdams.com – Biography, prints, and information about this artist.

4.2.4 Digest & Display

*Ceiling***:** Hand painted plaster ceiling tiles made by Above View with retro leaf pattern cover the ceiling and help with noise (Figure 26). There are recessed energy efficient LED lights that provide soft lighting alongside the natural lighting.

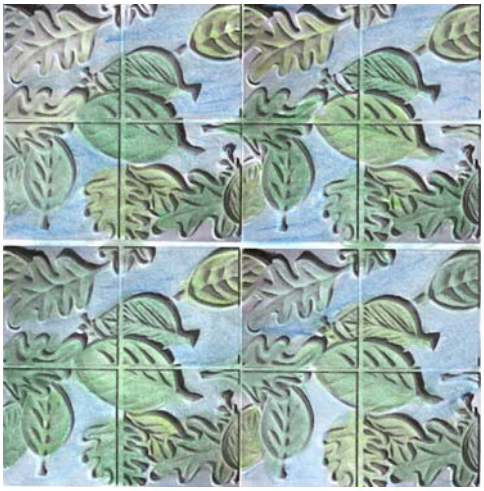

FIGURE 26: Retro Leaf (AboveView.com)

Walls: Local art hanging on the walls helps people get their art viewed and purchased. Ansel Adams' photography is displayed not only because it is beautiful but also because during his life he was dedicated to wilderness preservation (AnselAdams.com). "Through his photographs he has touched countless people with a sense of that mystique and a realization of the importance of preserving the last remaining wilderness lands" (AnselAdams.com).

FIGURE 27: Jeffrey Pine (AnselAdams.com)

Names of trees and leaves of Alabama trees from Aces.edu provide a decorative and educational wall treatment. Fresh herbs hang in an ELT living wall, ready to be picked and enjoyed (Figure 28). LEED-sensitive iconic panels from B & N industries create a 3-dimensional art piece. And real tree trunks decorate the half wall below the open kitchen. A chart with the world's largest trees decorates a wall and shows off the scale of these massive plants (Figure 29). Zero VOC paint in a shade of green from the company Yolo Colorhouse treats some accent walls. Green was chosen because it "is associated with nature and general well-being" (Baraban and Durocher 77). These paints combine naturally occurring elements with environmentally responsible paints (bettencourtwood.com).

FIGURE 28: Living Wall (eltlivingwalls.com)

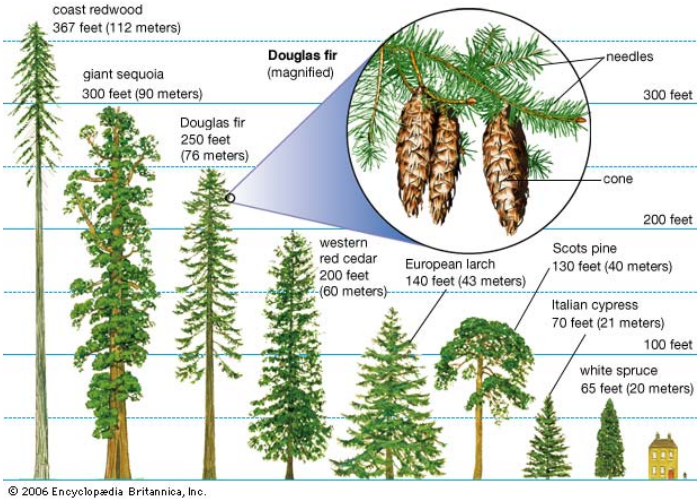

FIGURE 29: Tallest Trees on Earth (Encyclopedia Britannica 2006)

Floors: Sustainable cork flooring from greenfloors.com covers most of the restaurant. Cork was chosen because it is resilient, anti-microbial, and environmentally correct (greenfloors.com). What could have been waste has been turned into a beautiful, sustainable floor (greenfloors.com). Rubber flooring from Norarubber.com will be

behind the bar and in other high traffic areas. Finally, linoleum flooring from greenfloors.com will cover the kitchen and bathrooms. Linoleum is made from a mixture of all natural materials, is easily recycled, easily cleaned, and will last a while (greenfloors.com).

Tables: Curved kirei board tables were designed with reclaimed wood legs. Kirei is a material made from reclaimed agricultural fibers that have been pressed together using formaldehyde free adhesive (kireiusa.com) (Figure 30). A curved form was chosen because it is organic, fluid, and easy on the eye. Two can be pushed together and completely change the look of the tables. In addition, "people tend to be attracted to curved forms" (Baraban and Durocher 71). Games and information are displayed on the tops of the tables and will be changed semi-frequently to maintain excitement.

FIGURE 30: Kirei (Kireiusa.com)

Dividers: The dining floor consists of five curved 3-form eco-resin dividers with natural materials sandwiched between the panes. 3-form is the "leading manufacturer of award-winning, sustainable materials and architectural hardware solutions" (3-

form.com). These dividers minimize sight lines for those guests who prefer more privacy. This material was chosen because it allows light and movement to show through, but provides an intimate place for guests to dine. They are moveable as well. The seven tables with dividers make up the "barriers" portion on the dining room, the other tables make up the "fields" portion (Baraban and Durocher 71).

Planters: The dining floor consists of six custom wave planter boxes, made from plyboo, that house air purifying plants. Some of the best air purifying plants are: Bamboo palm, Chinese evergreen, English Ivy, Fiscus, Gerbera daisy, Mother in Law's Tongue, Peace Lily, and Pot mum (humeseeds.com). The boxes serve as additional display space for information about the plants, what they remove and other things as well as a bookcase for books and magazines for guests to view.

Menu: The menu for Gingko will change daily depending on what foods are readily available, what there is an abundance of, what there is a shortage of, the season, etc. It will be a small menu consisting of a selection of 2 different appetizers, 4 different entrees, a selection of side dishes, and 3 desserts. This keeps food from spoiling, keeps food fresh, and keeps patrons excited about the dishes. In addition, menus do not have to be printed and paper wasted. The menu will be written out nightly on a number of chalk boards to be walked by the server to each table. This approach encourages questions and conversation as well.

Restrooms: Presented on the back of the bamboo doors will be information about high efficiency toilets from Toto and how they save water. Articles can be displayed about paper and water waste. The countertops are a durable plyboo butcher-block from Bettencourt wood. There are also recycled glass sinks from GreenGlass.

Bar: The bar top is Dakota burl from Bettencourt wood (Figure 31). Dakota burl uses waste from sunflower seed husks to create a composite material that looks like actual burl (bettencourtwood.com). The sunflower husk is an abundant bi-product; it utilizes bio-based technology and emits zero VOCs (bettencourtwood.com). On top of the bar is information on organic wine, liquor, beer and local vineyards of Alabama, as well as information on the Dakota burl.

FIGURE 31: Dakota Burl (Strawsticksandbricks.com)

Store/Wait area: The retail store is a place to sit while waiting on a table, to grab a drink, or to shop around. The store will sell books about plants and trees, herbs, and eco-friendly products. Besides books, a plentiful amount of eco products will be sold from home accessories and kitchen gadgets to jewelry and crafts made by locals. It will also house information about any materials used in the restaurant so that people know where they can be purchased. There are also “fact trees” that hold fun and unusual information and can be added to by the community.

Outside: The outside of the restaurant has a wrap around deck that focuses on the view of the lake and trees. There are dining tables and hanging planters. There is also a walking path that goes around the lake. Most plants and trees are labeled on the path so the learning experience extends beyond the walls of the restaurant.

4.3 Intensity

E: Entice and entertain everyone. Gingko offers a comfortable, relaxing dining experience for anyone who walks in its doors, whether they are interested in gaining information and knowledge or not. The use of unique materials and bright wall décor are enough to delight and surprise most. There is an herb wall, long rows of windows, and a constant fresh cross breeze. There are seven different table schemes to chose from that will keep diners occupied and pleased.

R: Relax; the natural color palette is soothing, as are the sounds of nature coming from the outdoors. The atmosphere is casual, friendly, fresh and clean.

I: Information is everywhere but is presented in a very entertaining way and is completely optional whether it is taken in or not. It is found on the walls, the tables, and even the restroom stalls. After experiencing the dining atmosphere and more information is wanted, the retail store offers books, products, and material samples. Patrons can even find contact information for all the textiles and materials found inside the restaurant.

N: Natural elements surround guests in Gingko, such as the furniture materials, the flooring, the air purifying plants, or the outdoors. It is overall, a healthy, entertaining, and stimulating place to eat.

4.4 Triggers

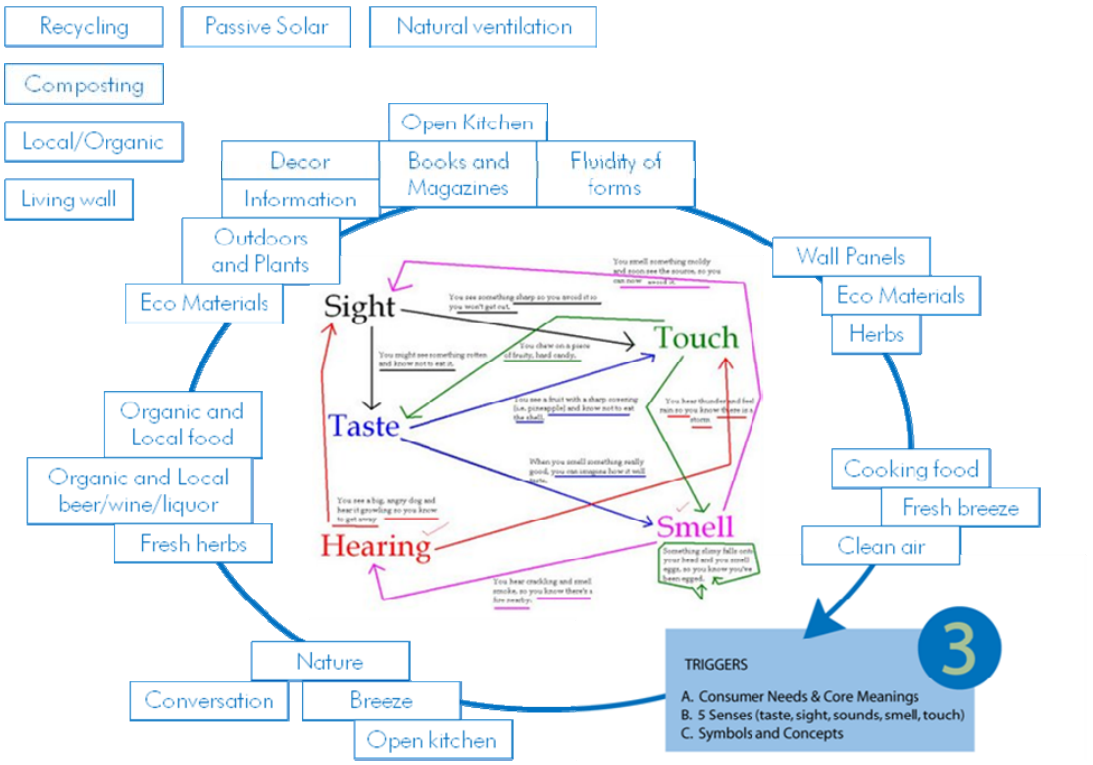

FIGURE 32: Gingko - Step 3

4.4.1 Stimulating the 5 Senses

Sight: Books and magazines in planters, views of outdoors and natural lighting, wall colors, community post, art, photography, open kitchen, flooring and table materials, table top information, wall information, special arrangement of dining room, fluidity of forms

Sound: Nature, breeze, conversation, open kitchen,

Touch: Iconic wall panels, flooring, table and bar tops, herbs,

Taste: Organic food, organic/local wine, beer, and liquor, fresh herbs

Smell: Clean air from cross breeze, clean air from purifying plants, cooking food, herbs

4.4.2 Symbols and Concepts

Ginkgo is all about the concept of appreciating nature. It also emphasizes the concepts of fresh and organic food and drinks. Some symbols presented on the restaurant walls are those of Alabama tree leaves others can be found on the table tops.

4.5 Interaction and Interpretation

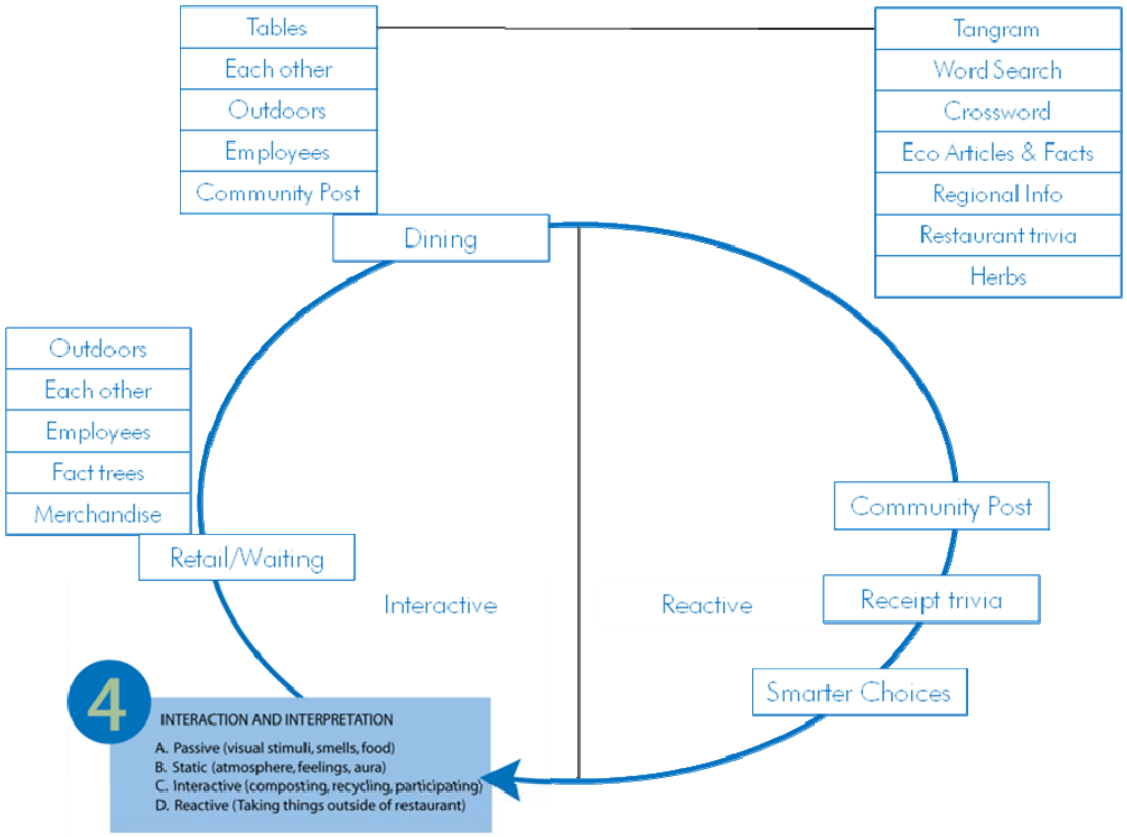

FIGURE 33: Gingko - Step 4

4.5.1 Interactive

Entry: In the entry/store, patrons can interact with the merchandise for sale, the fact trees, the employees, the outdoors, and each other.

Dining: In the dining room, patrons can post information, events, and inspirational stories on the community board; they can interact with the employees, or with other dining patrons.

The tables are going to host the majority of the interaction. Gingko has seven different table schemes throughout the floor. They consist of an Alabama trees word search, plants and trees crossword, articles/eco-current events/fun facts, restaurant trivia, eco-material tangrams, Alabama regional information, and herbs. These table schemes will be updated and changed out regularly (approximately once a month) to keep information new and exciting. Live trivia can be hosted on certain nights as well as other competitions.

The tables are designed for increased conversation and interaction person to person. The tables can be pushed together to house large parties. The wave form increases the view of each other while creating soft, organic edges. For more privacy, movable dividers can shield a table from others.

4.5.2 Reactive

The community post is a place where people can return to show some lifestyle changes made, pictures of gardens, or interesting facts/articles found. Receipts have questions or goals printed on them and when they are returned answered customer receives something free.

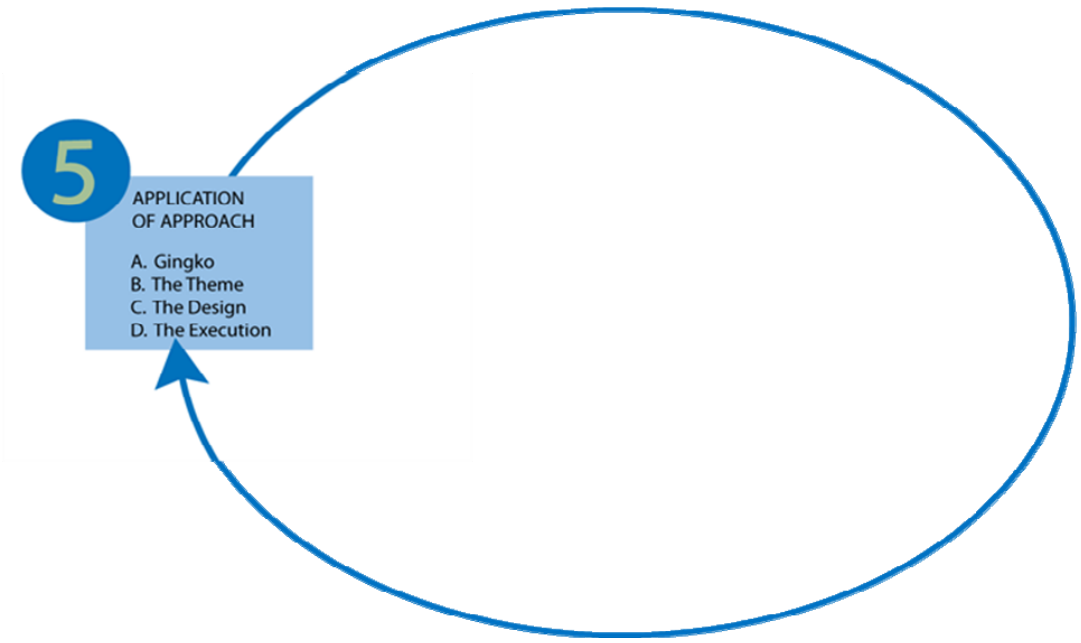

Figure 34: Gingko - Step 5

Finally, once steps 1 through 4 of the design approach have been completed, it is time to turn the concept into life.

4.6 Floor Plan and Renderings

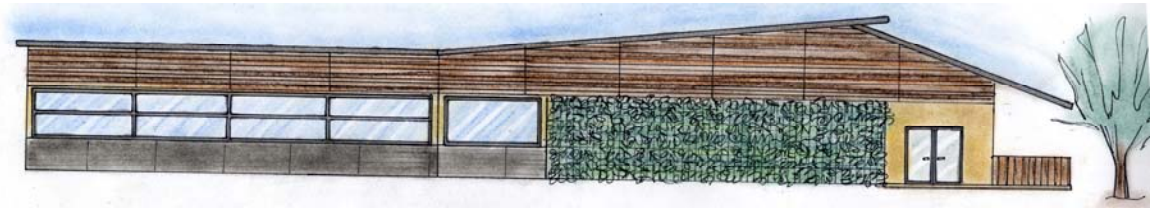

FIGURE 35: Outside Elevation

Figure 35 is a pastel rendering of the outside of Gingko. The exterior coverings consist of a living wall, reclaimed wood, fiber cement board, and galvanized aluminum.

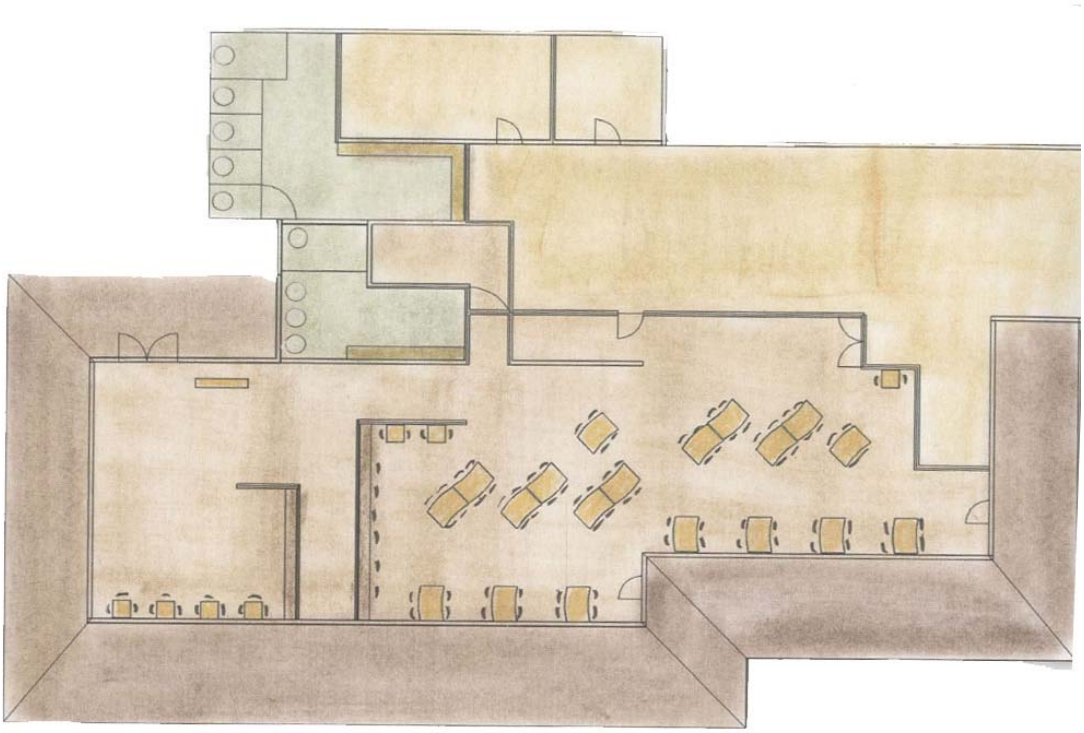

FIGURE 36: Floorplan

The restaurant holds about 80 people on the inside, and the huge wrap around deck can easily hold 50 more when the weather is permitting.

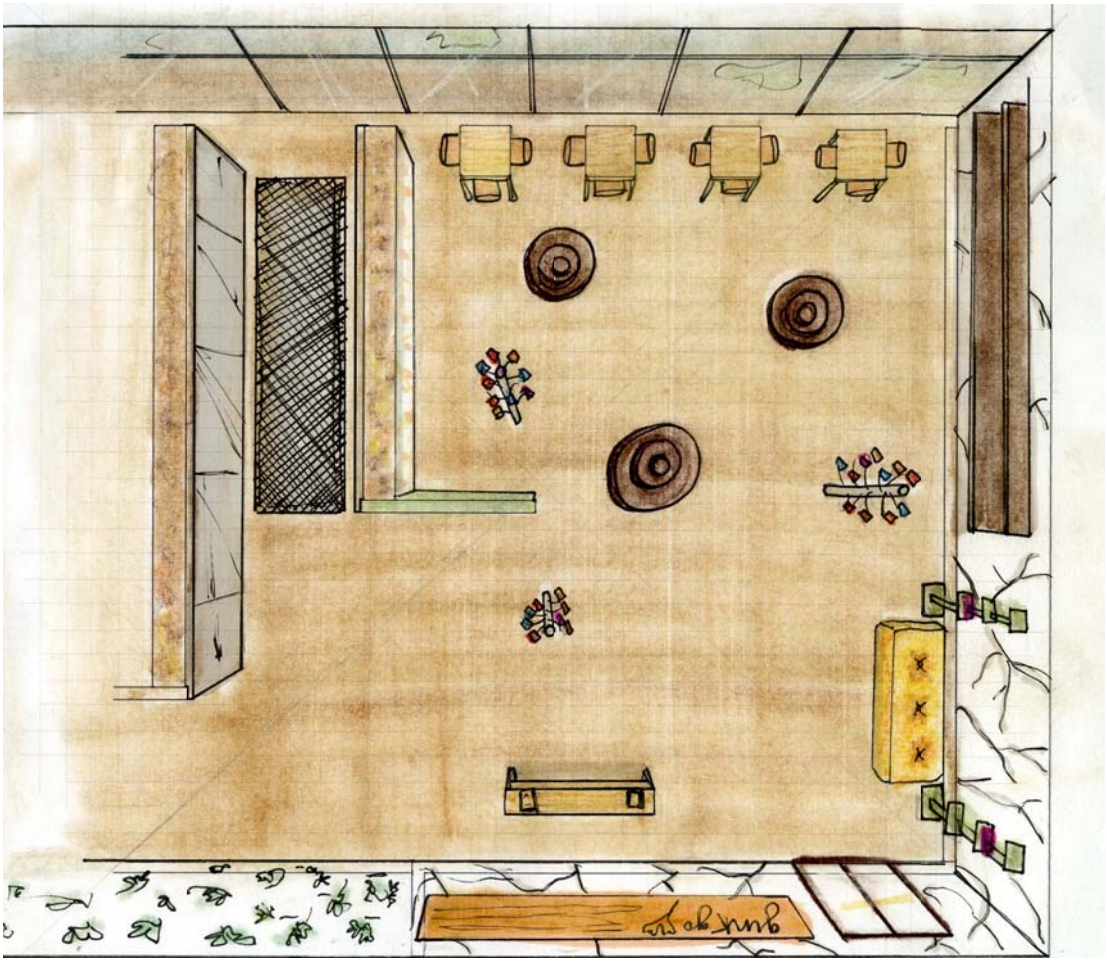

FIGURE 37: Top View Store/Waiting

The retail store and waiting area is designed for shopping, relaxing, and enjoying drinks. Patrons have access to a full bar, high top tables, and merchandise. This is more than enough to keep them happy while they are waiting for a table.

FIGURE 38: Dining Perspective 1

FIGURE 39: Dining Perspective 2

4.7 Material Boards

FIGURE 40: Dining Perspective 1 Material Board

FIGURE 41: Dining Perspective 2 Material Board

FIGURE 42: Elevation/Floorplan/Bath/Kitchen Material Board

FIGURE 43: Waiting/Retail Perspective Material Board

CHAPTER 5: FINAL SOLUTION

5.1 Work in Progress

The final model is in three-eighths scale and is constructed out of task board, foam core, matte board, cork, and wood. Everything was either cut by hand or drawn in Adobe Illustrator and cut by the laser cutter, except for the toilets which were drawn in Solid Edge and 3-D printed.

FIGURE 44: Building Phase - Dining

FIGURE 45: Building Phase - Back

FIGURE 46: Building Phase - Front

FIGURE 47: Building Phase - Entire Top

FIGURE 48: Building Phase - Dining Close Up

FIGURE 49: Building Phase - Waiting

FIGURE 50: Building Phase - Dining Close Up 2

FIGURE 51: Building Phase - Bathrooms

FIGURE 52: Building Phase - Deck Railing

FIGURE 53: Building Phase - Landscaping

5.2 Final Model

FIGURE 54: Final Model - Front/Left

FIGURE 55: Final Model - Front

FIGURE 56: Final Model - Entrance

FIGURE 57: Final Model - Living Wall

FIGURE 58: Final Model - Back

FIGURE 59: Final Model - Back Left

FIGURE 60: Final Model - Back Right

FIGURE 61: Final Model – Deck

FIGURE 62: Final Model - Bird's Eye Floorplan

FIGURE 63: Final Model - Waiting/Store Area

FIGURE 64: Final Model - Waiting/Store Area 2

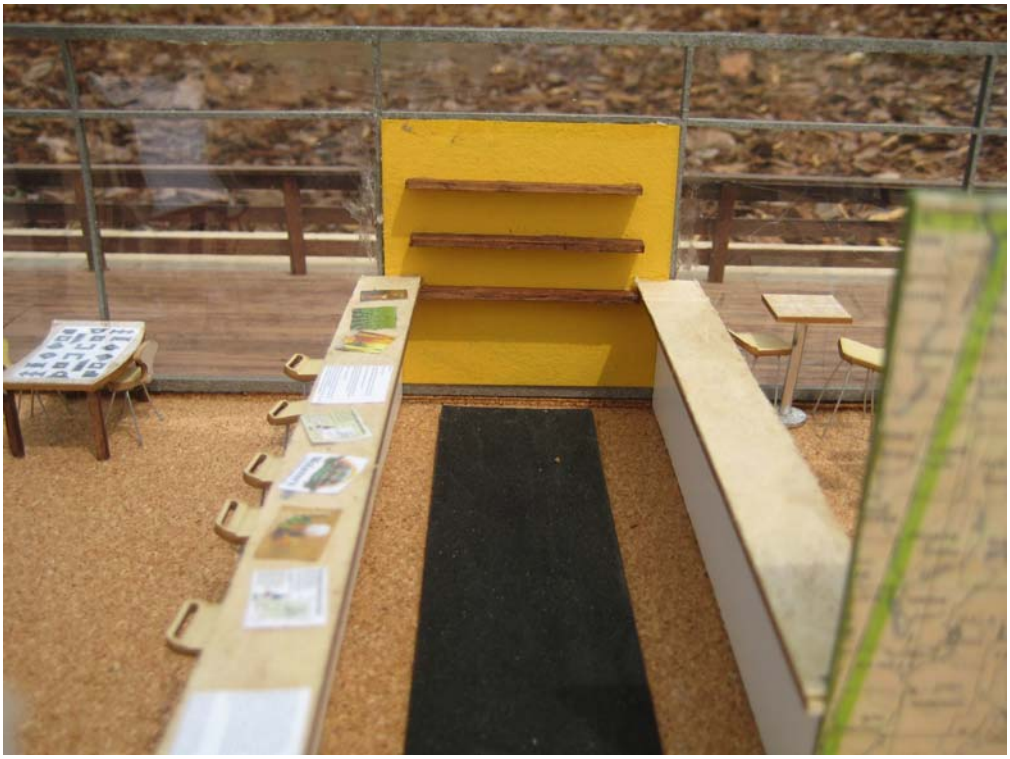

FIGURE 65: Final Model - Bar

FIGURE 66: Final Model - Dining with Ceiling

FIGURE 67: Final Model - Dining view 1

FIGURE 68: Final Model - Dining and Waiting

FIGURE 69: Final Model - Dining view 2

FIGURE 70: Final Model - Dining view 3

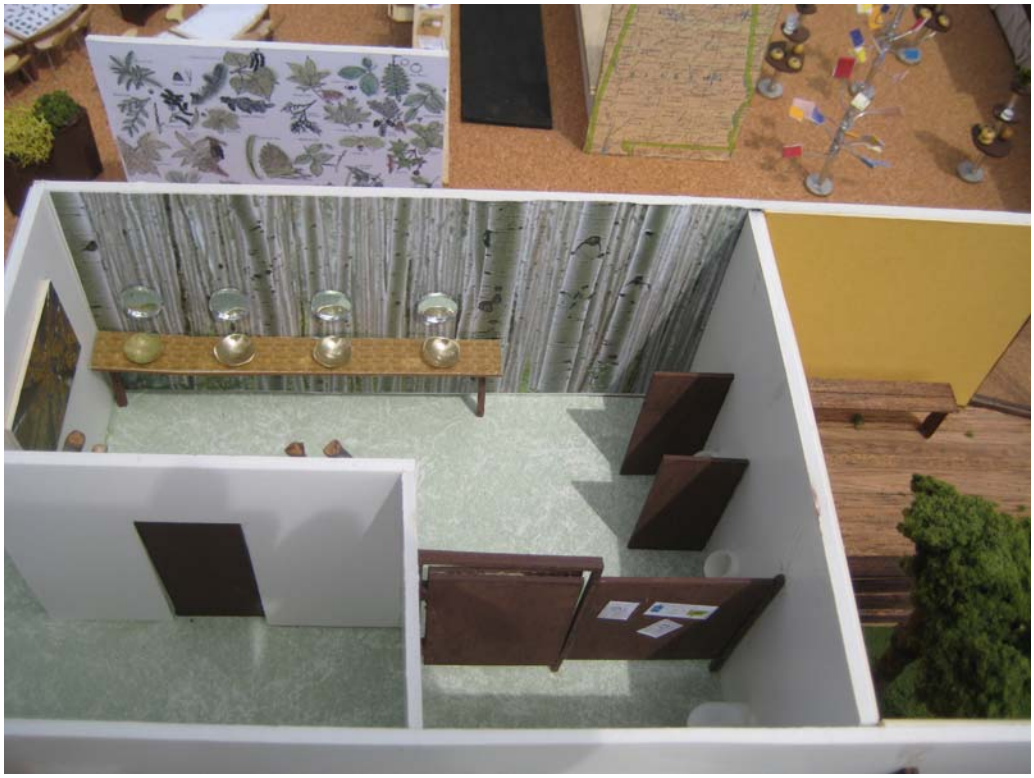

FIGURE 71: Final Model – Men's Bathroom

FIGURE 72: Final Model - Bathrooms

FIGURE 73: Final Model - Women's Bathroom

CHAPTER 6: CONCLUSIONS

6.1 Summary of Study

Chapter one assesses what exactly this study is about. It begins with the problem statement, need for the study, and goes into preliminary research that provides the structural support for the study. It concludes with the objectives, assumptions, scope and limits, procedures and methods, and finally the anticipated outcome.

Chapter two begins the design research that specifically pertains to solving the problem. This is where surveys and questionnaires are introduced.

After the majority of the research has been found, chapter three goes into the development of the approach. Enough information has been found at this point to put together a design approach for an entertaining and educational restaurant.

Next, chapter four takes this approach and applies it to a fictional restaurant called Gingko. All the steps are taken according to the approach that was written and an entire restaurant is designed.

Chapter five shows the completed restaurant.

6.2 Recommendations

The approach for this project was geared towards designing an eco-friendly restaurant that teaches about nature, the environment and sustainability. Although this is the path I took, it could also be a good idea to create an approach or set of guidelines for

a restaurant environment that can teach about any subject from space to baseball. In addition, restaurant trends are continually changing as is technology. The approach can always lend a hand in guiding someone along the design process, but current trends and current technologies should always be considered and applied.

Furthermore, in the future, this approach may be modified even more to create a design process for public places besides the restaurant such as waiting rooms in hospitals and doctors' offices, sports arenas, etc.

6.3 Synopsis

This design approach can aid future and current restaurateurs in design and creation of a meaningful restaurant experience that gives more to its clients than just a meal. In the thesis, the approach was applied to the design of a restaurant with the theme "Plants and Trees," but this was simply an example of how to apply the solution. The approach can be followed according to whichever theme is chosen.

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