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Team Earthship

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Abstract

Through a Grand Valley State University course on “Wicked Problems in Sustainability”, our team was formed focusing on energy efficiency. Inefficient energy within our homes is one of the biggest culprits in unsustainable energy use; “The amount of energy wasted by 75,000 average American homes in a single year is equal to the waste that occurred in the 2010 BP Oil Spill” (erc-co.org). Looking at more energy efficient ways of living, we explored Earthships. “The Earthship is the epitome of sustainable design and construction. No part of sustainable living has been ignored in this ingenious building” (earthship.com). As a design that has been evolving for the past 40 years, it is built from recycled materials, includes a built-in greenhouse, has its own water filtration system, and has a focus on off grid capabilities. We relied upon the “wicked problems framework”, and scaled the wicked problem of sustainable living down into a small experiment where introducing a workshop for the local community would bring knowledge to interested community members and become a powerful tool in rethinking sustainable housing. Our group is interested in the ways in which the homes we live in can be more energy efficient. We are proposing a local workshop that would include general Earthship construction, costs, hands-on building with tires, codes and regulations. In Irvine and Kaplan’s (2001), “Coping with Change: The Small Experiment as a Strategic Approach to Environmental Sustainability”, the authors suggests that “People have an inclination to be threatened by change; humans are much more comfortable with the known than the unknown” (p. 714). We plan to bring familiarity to the general public by talking with local stakeholders experienced with the Earthship model and incorporating their knowledge in the workshop.

INTRODUCTION:

Wicked problems are so vastly complicated and complex that they are often without an exact definition to encompass the whole issue. Rittel and Webber (1973) explain, “there can be no final solution, since any resolution generates further issues, and where solutions are not true or false or good or bad, but the best that can be done at the time. Such problems are not morally wicked but diabolical in that they resist all the usual attempts to resolve them” (Brown, 2010, p. 4). In attempts to tackle and frame these complex wicked problems scholars have found that the need for “interdisciplinary approaches to wicked problems opens up a number of tasks that no one has the proper disciplinary training to undertake” (Thompson & Whyte, 2011).

A key aspect to addressing a wicked problem is local citizen participation, expert or not. This participation could be fundamental in helping solve wicked problems, such as energy inefficiencies in more traditional housing today. Knowledge is also a crucial aspect to this participation. As a group we took into consideration that “citizen participation, as a basic political value, is a slippery concept to describe or judge” (Fischer, 2000, p. 33). In general, local community members may be readily available, but to what extent is unknown, making collaboration and integration of the local stakeholders and knowledge an important but uncertain process.

Through Grand Valley State

University’s (GVSU) “Wicked Problems in Sustainability” course, our group chose to tackle the wicked problem of energy-efficiency in homes. Traditional homes today focus on consuming from outside, distant sources, rather than utilizing what is already available through our surrounding environment, such as wind, sun, rain, and recycled materials. Consuming electricity from distant sources leads to energy losses averaging six-percent annually in the United States from transmission and distribution losses (EIA.gov).

Additionally, “The percentage of household income spent on utilities has climbed 70 to 119 percent since 2001” (erc-co.org).

In this course, we learned how to take such large-scale issues and frame them down into small experiments as described by Irvine and Kaplan; a small experiment after all, is “simply a local response to a local problem” (Irvine & Kaplan, 2001). We as individuals do not need to be scientists or experts to understand wicked problems. When individuals feel they have the power to make a difference, there will be a “better chance at success” (Kaplan, 2001, p. 714). Small experiments, on a local level are more feasible, as well as a way to “lessen resistance and increase familiarity...; small steps would maintain a certain level of the familiar while still allowing for exploration of alternatives” (Kaplan, 2001, p. 716) and alternatives are important when dealing with wicked problems, because the problem is always changing and evolving.

ACTION PLAN:

In "Coping with Change" Irvine and Kaplan (2001) explain that "If an individual or group stops to ponder a problem, the solution is presumably not obvious, because if it were, it would no longer be a problem. Thus, not knowing what to do next is the characteristic state of mind that leads to problem solving" (p. 714). It becomes human nature to decide upon solving a problem, but it's unlikely to always follow script. Upon using a generic decision making model, our group considered the 6 steps as Stefanovic (2012) describes:

1. Identify the project objectives, problem, and opportunities.
2. Identify constraints that possible solutions must respect.
3. Identify variable alternative solutions.
4. Select evaluation criteria of alternatives.
5. Evaluate alternatives and select the preferred option.
6. Monitor and adjust the strategy, as necessary, documenting lessons learned.

Our group adjusted these general steps to cope with the complexities of the wicked problem surrounding energy efficiency. Our team collaborated on possible avenues to address this issue and incorporated our individual values since "Values infuse every stage of the decision making process" (Stefanovic, 2012 p. 14). To address energy

efficiency, we began by identifying three alternative solutions, the constraints around them, and our time allotment.

Our three alternatives were as listed:

1. Addressing our local community college's (Northwestern Michigan College) existing recycling bins, making it a more efficient process.
2. Looking into reusable building materials for homes and their availability in our local community.
3. Looking deeper into the materials used in modern home construction and promoting alternative home designs such as Earthships.

We decided to develop the third option and discuss ways to share knowledge of more sustainable housing options in our local community by introducing a workshop involving Earthship construction and design. We are all equally concerned about having the option to pursue sustainable housing in our area. A workshop addressing how to incorporate energy efficient design components developed in the Earthship model could offer a much-needed alternative in the modern construction today. Such a workshop could spread knowledge into our local community as a tool for empowering new energy efficient state of minds, and introducing some unfamiliar construction techniques to our local area. Further, "From this perspective, having a better grasp of the

issues and alternatives in general might well lead to a more constructive outlook” (Kaplan, 1990, p. 22). This gained knowledge and outlook could then remove some of the fear that tends to accompany new and unfamiliar technology (Irvine & Kaplan, 2001).

Throughout our class, several readings were assigned. Among these readings, our group found a consistent message. In order to tackle wicked, global issues, we need to start with a resource readily available, our local community members. (Think Global, Act Local.) We needed to promote the project idea of an Earthship Workshop, and foster problem solving through a small experiment, or a small case study, which Irvine and Kaplan (2001) suggest is just a story about what other people have done. An approach to change needs to be one that helps introduce familiarity to new alternatives. This approach needs to involve the public through invested stakeholders, which in turn helps build ownership of the process and incorporates local knowledge and local talent that all too often goes to waste (Irvine & Kaplan, 2001). A small experiment like our workshop approaches change through taking small manageable steps. Within these small experiments, special emphasis is placed on providing creative opportunities for citizen involvement.

Our group had many one-on-one consultations with various stakeholders and those meetings influenced our decision making process in regards to the workshop. Furthermore, throughout

consulting with our stakeholders we monitored our goals and adjusted our workshop scenario. This included breaking it into different sections, creating various options for learning the different components of an Earthship and even creating the possibility of having Mike Reynolds, creator of Earthships and Earthship workshops, put on a workshop in our community.

PROCESS:

After forming our action plans, we needed to start the critical process of researching Earthships and their energy saving techniques, as well as finding solutions within our local community to spread the knowledge.

There are many components to Earthships that we needed to research. We wanted to investigate the barriers and challenges of incorporating them into our local setting since this would “support innovation, maintain local relevance and experimental validity” (De Young, 2013). Researching Earthships gave us the knowledge we needed to relate to the public, and become better prepared to answer community members’ questions. Our research included, the general workings of an Earthship, the power organizing module, water organizing module, grey water system, solar and wind power, building materials, and thermal mass. More intricate research entailed investigating local building codes, permits needed, Earthship construction in different climates, pre-existing Earthships in other states and countries, along with

electricity consumption between traditional construction and Earthship construction, and costs.

Our group also sought out local companies that could provide the knowledge we would need to put forth our idea of an Earthship workshop in our community. We connected with SEEDS, a non-profit organization fostering local solutions to global issues. We also connected with the owner of Inhabitect LLC, a green roof building company, who provided our group with extensive knowledge of building construction. It is a long, detailed process in gathering all the permits for a home to be built regardless of the materials from which it is made. From the knowledge presented in our course readings, we knew that, “Despite the time commitment required, studies show that meaningful one-on-one consultation with community members results in more sustained buy-in of proposed solutions and ultimately ensures that a decision-making process achieves goals of social justice, equity, and participatory democracy”; (Stefanovic, 2012, p.15) therefore it was important to our forward process to talk one-on-one and accomplish all we could in the time allowed to us.

Our greatest accomplishment was finding and meeting a woman who has built an Earthship herself. Our group felt it was important to remember in this process "Citizens rarely benefit from generic instructions. And they certainly do not take kindly to being informed by experts about how they must behave in their local setting" (De

Young, 2013). As a group, we felt it was important to seek knowledge from a local source pertaining to Earthships versus simply relying on internet, generic expertise.

Most homes are pulling from the grid, relying heavily on the use of coal and natural gas to produce the electricity for them. Forty years ago, Michael Reynolds decided it was past time to create a more efficient way of living, “living with the earth and not on it”, using what is available to us, local and renewable (Reynolds, earthship.com). Using this philosophy, he created the Earthship; a home built from rammed earth, tires, recycled materials, and is a home that lacks the need to be hooked up to any municipal utilities.

Our group’s focus fell in the area of Garfield Township. Our action plan was to strictly stick to this township, and to receive word on building material restrictions. With the allotted time schedule, our group chose to deal with only one township; there would not be enough time to address and investigate more than one. We chose Garfield Township because it was close to where the majority of our group lived and a bit easier than looking into the City of Traverse City. Our group found that Garfield Township has no restrictions against any building materials, so long as the outside is painted or stained. However, upon further investigation, our group discovered that the building process of alternative structures is very involved, at times more so than we realized.

possible instructors.

COLLABORATION:

In the article “To Build or Not to Build a Road,” the author suggests how important it is to avoid relying upon familiar strategies and to consider instead more innovative, even non-conforming solutions to problems that arise within the process of decision-making (Stefanovic, 2012). Connecting stakeholders with an interest in Earthships, and finding how their connections and values can help put forward a community workshop can provide more innovative solutions to introducing Earthships. We were not given a list of community members interested in energy efficiency or viable alternatives to housing, yet through carefully prospected research, we were able to find local stakeholders that fit our project perfectly. They became our personal contacts, and a basin of knowledge available for use. It was truly a great accomplishment to speak with a community member who had built the Earthship herself, giving our group a great first hand recall on what it was like to build an Earthship, and the trial and tribulations with it. Another important stakeholder we were in touch with was the Program Coordinator for Northwestern Michigan College’s Extended Educational Services. Through a feedback and information sharing “dialogue event” organized by our class, this gentleman was able to provide us a business perspective of a Workshop; for example, the potential costs, venues, and

RESULTS:

Our group aimed high for a local workshop that gives transformative knowledge to the community on the Earthship model. This we found to be a very challenging task. It is important to note that time has been a large constraint. Because of the time constraint, the project will not reach fruition by the last day of class. Yet, despite the challenges and constraints, this project for community outreach is moving forward for us, and in the last weeks of class has found a very promising direction. Our team is passionate enough with our direction that there has been talk of continued conversations with stakeholders and even practicing Earthship building techniques with our contact that has experience with building an Earthship.

The nature of this outreach project is typical in that it involves mostly conversations with stakeholders to get it going. Because the Earthship model is very different than anything most people have come across there can be resistance. Kaplan and Irvine (2001) suggest, “the thought of changing jobs, visiting a new city, or implementing new technology is frequently viewed with some apprehension” (p. 714). A type of apprehension may exist with this workshop because of the unknowns that many people share with this type of technology.

As a group we recognize that

helping to overcome people's fear of change is a goal of the workshop. Additionally, Irvine and Kaplan (2001) describe that "public participation [is] an essential and constructive part of the process" (p. 716). Participation then becomes critical in that it is the root of a workshop's success; if there are no participants, there is no need for a workshop. Yet we have found that the lack of Earthship knowledge in this local area could indeed be remedied by the very workshop that we are trying to implement.

Other aspects or considerations to this workshop, some of which were discussed at the class dialogue event, include the following:

1. Locating community members with knowledge and/or interest in this type of workshop.
2. Searching for local stakeholders that have previous experience with Earthships. This may help with general knowledge, workshop considerations, and even a possible instructor.
3. Logistics of the workshop itself including costs of the workshop, time of year to start, donation of select materials, breaking up the workshop into sections, as well as a vicinity for the workshop.
4. Possibly contacting Earthship Biotecture in Taos, New Mexico to bring one of their already successful workshops to our area.

FUTURE CONSIDERATIONS:

In addition to finding someone who can teach the workshop, there is still a need to spread the word and momentum through the community. A few stakeholders said they would be interested in leading/teaching workshops, and though this is a great step forward, there is still much to be considered as outlined in the results section of this paper.

Various details were asked about in the dialogue event, which indicate a need for further research, including more technical aspects. For example, the energy in an Earthship is generated by wind and solar. The solar photovoltaic panels collect and convert the sun's rays into a DC current and then are usually stored into golf cart batteries before they are filtered through the Power Operating Module for use. One consideration is the amount of energy that can be stored. With the current usage in mainstream society there more than likely will be a need for larger storage capacity, *if* the homeowners are not planning on adjusting their energy usage. Perhaps these workshops can inspire students to design more efficient and cost effective storage than the golf batteries currently used. Moreover it is still an option for an Earthship to be tied to the grid.

Various builders should also be consulted to make sure the proper materials are being used for weather proofing homes, keeping out rain, snow, ice, etc. One of our stakeholders suggested looking into proper building materials for Northern Michigan and how to keep a roof dry. Construction and

materials used may vary state-by-state and even county-by-county. Moreover, weather and results aren't guaranteed to fit every Earthship the same.

In continuing efforts to make this workshop successful and give our local community this energy efficient housing alternative a look into financing options and availability is key for a smooth transition. Some banks and insurance companies, as well as township codes and regulations, require homes to be tied to the electric grid and have standard sewage/septic systems. This may be a future hurdle in building Earthships locally, but not an impossible one. A bigger opposition for financing may be because there are no Earthships currently in the state of Michigan. It is possible that these are topics that can be addressed in a future workshop.

OPPORTUNITIES:

Through framing large scale problems of energy production and consumption down to small experiments, much like a case study, future students have the opportunity to create a workshop informing people about options in energy efficiency from alternative housing models to how much it would cost to install renewable energy systems. Workshops or case studies could include such details as how to maintain these structures, as well as advise people about the pros and cons of being off-grid versus grid-tied and how to find out what their county/township requirements are.

In reviewing the overall work of our group, one consideration our group would suggest when contemplating a workshop in your area would be to include contacting Earthship Biotecture in Taos, New Mexico. By including this contact, there is potential opportunity for combining an already existing and successful workshop with a local focus. Our group started at the local level first, trying to create a workshop from scratch when we could have potentially had more success by contacting Earthship Biotecture, and not trying to reinvent the wheel on many aspects of the Earthship design. While we need local participation, local stakeholders and local adaptations, there is also a place for incorporating experience and expertise. Had we been able to tap into more local stakeholder experience and expertise, we may have moved further towards our goal. In the absence of much local expertise and familiarity, it seems worthwhile to invite such experience to the area. The opportunities for this type of project to succeed not only depend on efforts from local stakeholder experience and input, but also on familiarity with a new model or technology that is being introduced. We succeeded in finding pockets of local interest and knowledge, but the bigger scope of implementing this project went well beyond the course timeframe for project completion. Future considerations should include local stakeholders with those who have technical familiarity with Earthship design.

References

- Brown, V. A., Harris, J. A., & Russell, J. Y. (2010). *Tackling Wicked Problems: Through the Transdisciplinary Imagination*. Washington DC: Earthscan.
- Buckenmyer, J. A. (2000, 12). Using Teams for Class Activities: Making Course/Classroom Teams Work. *Journal of Education for Business*, 76(2), 98-107.
- De Young, R. (2013). *Localization: Small Experiments for the Coming Downshift*. Ann Arbor: School of Natural Resources and Environment; University of Michigan.
- Earthship Bioteecture - Radically Sustainable Buildings. (n.d.). Retrieved April 14, 2015 from <http://earthship.com/>
- Fischer, F. (2000). *Citizens, experts, and the environment: The politics of local knowledge*. Durham, NC: Duke University Press.
- Irvine, K. N., & Kaplan, S. (2001, 12). Coping with Change: The Small Experiment as a Strategic Approach to Environmental Sustainability. *Environmental Management*, 28(6), 713-725.
- Kaplan, S. (1990). Being Needed, Adaptive Muddling and Human-Environment Relationships. *Environmental Design Research Association*, 19-25
- Spooky Statistics About Energy And Water Waste - www.erc-co.org. (2013, October 29). Retrieved April 22, 2015 from <http://www.erc-co.org/spooky-statistics-about-energy-and-water-waste/>
- Stefanovic, I. L. (2012). To Build or Not to Build a Road: How Do We Honor the Landscape through Thoughtful Decision Making? *Minding Nature*, 12-18.
- Thompson, P. B., & Whyte, K. P. (2011). What Happens to Environmental Philosophy in a Wicked World? *Journal of Agricultural and Environmental Ethics*, 25(4), 485-498.
- U.S. Energy Information Administration - EIA - Independent Statistics and Analysis. (n.d.). Retrieved April 22, 2015 from <http://www.eia.gov/tools/faqs/faq.cfm?id=105&t=3>