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Education Energy

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Abstract

Team Education Energy formed at Grand Valley State University's Traverse City campus in the winter of 2015 through a course called "Wicked Problems in Sustainability" (LIB 322). For their project Team Education Energy reached out to Traverse City West Middle School with the idea to create an energy fair. The mission of the project was to help promote ideas of environmental stewardship and to engage and utilize student's creativity in contributing to the solution of energy efficiency and energy use. The middle school students formed teams and used these concepts to determine what energy efficiency improvements could be made within the school and how they could be made. Team Education Energy met with Heather Wares' advanced placement science class and discussed energy usage and encouraged the students to come up with solutions for their school that could be implemented. By involving young people and their school community in the project, the Team Education Energy was able to facilitate and encourage creativity, teamwork, dialogue, and problem solving skills while building a more sustainable future. Due to the team's project, the kids were better able to understand what energy efficiency encompassed, how they could help reduce energy usage and how they might make sustainable energy options more viable in their school. Team Energy Education solicited stakeholders from northwest Michigan for judging the middle school students' ideas and the winning team members were given a prize (\$50.00 fun pass to Crystal Mountain Resort). The community stakeholders were chosen based on their ability to assist in the execution of the winning idea and their knowledge of energy issues/solutions. An additional project objective was to inspire other schools to provide a similar platform for young people offering hands-on experience and support while learning to better their community's future.

Keywords: children, problem solving, wicked problems, energy efficiency, sustainability

Introduction

Being able to understand the complexity of wicked problems can be life altering in many ways. It is easy to look at an issue and feel too small to make a difference. We live in a tangled web where one complex issue is often interconnected with others. One way to make a difference in the web is by allowing everyone connected to make their own small changes, and through this process, influential societal shifts for the better can be accomplished (Irvine & Kaplan, 2001). Feeling powerless can be a large part of why many people do not try to take on solving environmental problems (Kaplan, 1990). Team Education Energy's mission was to involve and unite the professional community with the school community; both parties have important tools that can be used to progress wicked problems. Through community dialogue such as this, unique solutions for complex issues can be formed. Discussion, interaction, creativity, teamwork, and problem solving are all skill sets required to tackle wicked problems. By involving the younger generation in such activities, these skills are encouraged and developed at a young age, building a more sustainable future. It is significant to influence these abilities in the youth population because it allows them to have a voice and to continue to maintain said voice and involvement in their communities. By building competence through education in these issues, understanding between personal behaviors and environmental issues can be achieved. Competence in turn creates active participation, (Kaplan, 1990) which is a key element in addressing wicked problems. To eliminate feelings of insignificance our society must strengthen and prepare everyone to be involved.

The energy crisis is an ongoing problem, and both people and policy makers

are skeptical and threatened by new sustainable ways to produce energy. Generally speaking, people are resistant to adopt something new and unfamiliar (Irvine & Kaplan, 2001). New ideas can sometimes involve overcoming obstacles, but if there is a way to learn from these problems and work towards positive change, then there is a way to reduce the energy crisis. With increased loss in biodiversity, the melting of ice sheets around West Antarctica and Greenland, large-scale nitrogen and phosphorus-induced environmental change, it is vital that as a society we start creating steps forward in alleviating the issues (Rockstrom, 2009). Technology is continuing to advance at a rapid rate, so much so that the world many are born into will be unrecognizable by the time they are elderly (Brown, Deane, Harris, & Russell, 2010). Appealing to bright young minds to create new ideas for sustainable energy and engaging the public, policy makers, and scientists in conversation can bring both the right questions and the viable answers to the forefront. Citizen participation is important in many regards. Participation may not "solve" this problem but by engaging residents, we increase involvement from ordinary people and utilize their experiential knowledge. The more involved people are in solving issues – and the more knowledge is shared – the better prepared those people will be to find a solution (Fischer, 2000).

Action Plan

Since energy issues encompass such a wide range of stakeholders and possible solutions, our team narrowed its efforts to focus on local public schools. Public schools were chosen as the target in hopes of encouraging skills and competence in solving wicked problems in future generations. Further, modeling this effort in

one school will make it easier to implement in other school systems that follow the same curriculum and teaching method. Our team also hopes to lower the energy costs in the schools so there is more money in the school's budget that can go to other areas of importance and benefit the children's overall education. A concept we wanted to implement in our project was that of critical environmental education. "Critical environmental education (critical EE) teaches students to combine critical reflection with the ability to engage in local action to address social/environmental problems" (Ceaser, 2012). By introducing our project, we assisted in engaging youth in critical thinking and wicked problem solving. We wanted to give youth an opportunity to participate in a global issue, such as the energy crisis, and scale it down to the local level educating the students on how it directly affects them.

One technique taught in "Wicked Problems in Sustainability" was to approach problem-solving through dialogue. By inviting stakeholders from the community to create possible solutions (Fischer, 2000) a healthy dialogue was created to incorporate new ideas, and thoughts on how to address these issues. Our team Education Energy utilized dialogue and community involvement to take on this wicked problem by involving a group of eighth grade students who are rarely given the opportunity to voice their opinions and solutions. These students were from Traverse City West Middle School and attended an advanced placement science class taught by Heather Wares. Giving the students the opportunity to identify solutions to existing energy issues in their school community offered them a unique opportunity to contribute to wicked problem solving. By educating the students about energy issues, the team also hoped to increase awareness within the youth

population. This is an important step towards spreading awareness through the larger community of Traverse City. The project emphasized to the students the importance of critical thinking, dialogue, and collaboration when approaching a wicked problem or any problem. These skill sets were reinforced by having the students form teams to create their projects and developing a scoring system that emphasized creativity and feasibility in the projects. By allowing the students to create ideas on how to reduce energy consumption in their school, they are better able to understand what energy efficiency entails on a personal level, while also addressing the global wicked problem of energy usage. Many of the Education Energy team's values focused on community engagement, empowering the community to make a difference (at any age), educating the public about how they can make a difference in energy usage, and learning from the community to better understand viable solutions. A question the team let guide their process was the following: "what can we do for you?" By asking this question the kids were asked to create a project that addressed community needs and fit their goals as well. This goal was to create a way in which the team could show people that they have power and a voice when it comes to creating change.

Process

After identifying the community that we wanted to work with, we focused on building bridges between the school community and outside forces. We did this by recruiting stakeholders/judges who would be interested in our team's project. The stakeholders/judges were selected based on their energy knowledge, resources they had access to, and to what capability they could potentially assist in executing new ideas. The team was able to network and contact

people both locally and throughout the state who would be professional assets to our project. For example, a couple of the stakeholders ran an energy consulting business. It was helpful to see that these community stakeholders shared our excitement in the project and that they looked forward to working with the students. This encouraged a high level of participation from the stakeholders, which has proven to be a significant influence on the success of our project. Additionally, by having small experiments, it can promote local change and influence people's participation in making bigger commitments or continued changes (Kaplan, Irvine 2001).

The next step was our first personal interaction with the students. Education Energy put together an educational presentation to demonstrate and educate the students on energy issues. We explained the wicked problem as a complex world issue and showed them examples of small ways they could decrease their energy consumption at home. This allowed the students to see how their actions help contribute to the larger scale of energy usage. The idea of an energy fair was then proposed to the students to encourage them to evaluate their local school community and find unique efficient energy solutions. The students were then separated into eight teams of four and given a rubric outlining what would be considered a successful project. The students had three weeks to collaborate as team on their projects (their spring break included) and prepare to present them to our team. After the three weeks, Education Energy went back into the student's classroom where the ideas were presented and our team selected the top two ideas to be presented to the community stakeholders/judges. All presentations were recorded so that they could be presented again at a later date.

Once the top two ideas were chosen, our team Education Energy invited community stakeholders to a dialogue event held by our "Wicked Problems in Sustainability" course. At the event, invited stakeholders were asked to judge the 8th grade projects and to discuss implementation possibilities. The stakeholders/judges were given the same rubric that our team used when selecting the two finalists. They were informed to assign points (out of 15 points possible in each category) in the following areas: display, oral presentation, grade appropriateness, creativity and originality, and feasibility. We chose this scoring method so that the students would place as much emphasis on areas like creativity and originality as they would on feasibility and supporting data. Creativity was promoted because of its importance, which is often understated in scientific problem solving and its historical ability to play an important part in many great scientists' discoveries (Barrow 2010). Additionally, our course reading from Brown (2010) suggested that scientists value imagination. Once the two presentations were shown to the stakeholders/judges, we added up all of the points and the team with the most points was picked as the winner, (which we will discuss later.)

After the winning idea was selected, a discussion with our stakeholders occurred and we conversed about ideas on how to implement the winning idea into the school system. We were able to establish more contacts, funding, and networking through this process. By continuing to move forward and applying the idea into the school community, the team is showing students that they can make a difference. This has additional rippling effects because not only is this something the students can put on a resume or college application, but this is also something that they can feel positive about, become more interested in, and

hopefully implement in their future careers. Science fairs, like this energy fair, have been a venue for popularizing science and have been instrumental in encouraging young people to pursue a career in the sciences (Dionne et al., 2012).

Results

Seven of the eight student projects were presented and recorded by the team on April 7, 2015; the eighth project was presented separately and recorded two weeks earlier due to being gone on vacations the week of the other presentations. All judging took place on the same day to ensure scoring was as fair as possible. The projects consisted of the following: a hydroelectric generation system for sinks and drains, a notecard system to serve as reminders for students and staff to change their electricity use habits, two projects suggested motion sensors for lighting, sinks, etc., a windmill project, replacing styrofoam lunch trays with reusable ones, installation of Pavegen brand tiles (which produce electricity when stepped on), and having the school go paperless. Overall the projects were very well put together and exhibited a level of work unexpected of an eighth grade class.

Each project included data on electrical use in the school and how their project might reduce both energy usage and cost. Team Education Energy brought food and drinks for the class and the kids seemed to enjoy the event. While some projects were quite interesting such as the hydroelectric system in the sink, the feasibility did not seem practical. Of the eight projects presented the team selected two as finalists to be presented to the stakeholders/judges. The winning projects were the paperless and Pavegen projects. These groups scored high in both creativity and feasibility, which is what placed their

scores ahead of the other six groups. While the idea to go paperless was not creative in-and-of itself, the way in which the group presented it was. The group created a short video explaining their idea and performed a rap as well. The pavegen presentation was not exceptionally creative, but the team was unaware of the tiles existence so the concept itself scored high in the creativity category. The cost and simplicity of both ideas is what influenced team Education Energy to give high marks to both groups for feasibility.

The following day (April, 8, 2015) the videos of the two winning groups were presented at a “Wicked Problems in Sustainability” final dialogue event – along with the teams’ project presentation – to the stakeholders/judges as well as other teams from the “Wicked Problems in Sustainability” class and their stakeholders. Six stakeholders watched and scored the group projects that the middle school students created, their overall comments indicated that they were impressed with both the middle school students’ work as well as the Education Energy team’s work. The final score for the two teams were 315 and 320 (increments of 5 points were used so only 1 score separated the two teams) with the Pavegen tiles coming out on top. The judges’ commented in the scoring that though paperless did not involve startup money, the uniqueness of the tiles presented additional learning opportunities and connections. Most of the questions and comments from stakeholders were in regards to how the team might go about implementing the idea of the winning group and what type of impact it would have on the energy fair project continuing. The judges from the non-profit SEEDs organization offered to help the team with implementing the winning idea as well as helping them present the idea to TCAPS (Traverse Area Public School System) energy efficiency director Jason Hill. SEEDs

is a local nonprofit organization in Traverse City whose mission is to help put into action solutions to energy and other sustainability issues. They have worked with many different schools in the Grand Traverse area in helping to assist lowering energy consumption and have experience working with struggling youth to promote said missions. The stakeholders/judges found that the Pavegen tiles were a more visible project and that there would be less pushback from staff members on the tiles versus going paperless. They also suggested letting people purchase a tile to be installed and have their name or logo placed on it to help fund the project.

Our project has allowed connections and networking to be created between professionals and the community. By incorporating the youth community in our project we were able to bring about a unique skill set and creative ideas. Our team is also working to entice other schools in creating a similar type of event to engage their students with hands-on projects dealing with real world issues. Everyone must contribute as a whole to accomplish solutions. By incorporating citizen engagement there is more involvement from “ordinary” people. This encourages community’s coming together and thinking outside of the box, (Fischer, 2000).

Challenges

Challenges the team faced include some obstacles that are universal to any project: time, scheduling and funding. While the “Wicked Problems in Sustainability” class is 16 weeks long the class did not form groups until week four which left the team with only 10 weeks to create, finalize, host and summarize a project that met their lofty goals (the last two weeks of class were reserved for summarizing team project and

finals). Scheduling between team members, the middle school, and the stakeholders/judges only exasperated the time crunch to get the project done. One of the more difficult scheduling conflicts was that of spring break. Grand Valley State University’s and Traverse City West Middle School’s spring breaks did not coincide and of the eight weeks the team had to accomplish the project two were spent with little contact between the students and team Education Energy. Other scheduling issues arose because of differing work and class schedules and commitments to other class projects by team members. With the exception of throwing a pizza party for the students, the team’s project required little financial investment from the members. If the team had access to more financial support, a more impactful project could have been produced to carry the teams’ efforts forward.

Challenges the team faced that were unique to their project were identifying the stakeholders and implementing the winning idea. The project had two groups of stakeholders, the middle school students and the judges. The challenge in finding students was to find a group of students with a willing teacher, motivated student body, and the capability to turn out projects that would meet the standards the team was looking for. The team sent out several emails to the head principals of all public middle and high schools within the Grand Traverse area proposing the idea of participation in an energy fair. The first interested response was from Pam Alfieri who is the head principle at Traverse City West Middle School. The team was then referred to Heather Wares and her eighth grade advanced placement science class to partner with for their project. Finding stakeholders for judging followed the same approach, the team laid out their qualifications for stakeholders to be judges, searched the community for people

who met those qualifications, and then contacted them via email. The team wanted to choose stakeholders that had knowledge about alternative energy, had experience working with students and/or implementing energy efficiency solutions and who had access to funding that would make implementation into the school system possible. These qualifications narrowed the possible candidates considerably and – because of the limited amount of possibilities – it made finding judges that much more difficult. Another difficulty occurred after the judges were selected. They had to find a productive way to stay in contact and coordinate with the judges to keep them abreast of any further developments of the project. The judges came by way of several group members and as such each group member was responsible for contacting their own judge, at times this made coordinating goals difficult due to scheduling conflicts, changes in dates, and availability.

The last major challenges for the team include securing the implementation of the winning idea in the Traverse City West Middle School, and seeing if the energy fair will continue as part of the curriculum. The team's hope is to have the pavegen tiles installed into the middle school. This is important to the students and for continuing the energy fair. The team's barriers to having the tiles installed as of now are unknown. The team hopes to contact Jason Hill at TCAPS to discuss challenges they might come across in trying to accomplish the tile installation and how best to go about overcoming other challenges faced. By following through with the installation, Team Education Energy hopes to create some momentum to carry them through the challenges presented when trying to make the energy fair an annual event throughout the Traverse City Area Public Schools' system. This will involve the coordination of

other schools, and integrating the idea of “wicked issues” in a public school system and how small changes can make a large difference. Some of the challenges that will need to be overcome include student willingness and motivation, financial restraints, and scheduling limitations. By seeing the implementation of the tiles the team hopes that this will motivate future students to want to make a difference also.

Future Considerations and Opportunities

Our team's major future considerations are twofold: 1.) Make sure the winning idea is implemented and 2.) Carry the energy fair into the future and into other schools. As a team we have established professional working relationships with TCAPS and the non-profit organization SEEDS. The future path of this project includes facilitating further discussions between these two organizations. We will be contacting Jason Hill who is the energy consultant for TCAPS. At the first meeting with Jason we will discuss the results of our project and introduce the winning idea to him. We then hope to arrange a meeting where Jason can go into the classroom, meet the students, and have the students further explain their vision. We then plan to set up a discussion meeting where the interested stakeholders, our team, and Jason Hill can discuss the possibilities of implementation and present a timeline. By setting up meetings with groups like SEEDS, and key stakeholders in the school system, the team will be able to work closely with them to move the project forward. After that discussion the team plans to allow the professionals to take over the implementation of the project.

When speaking with SEEDS there was an interest in building a unified energy/science fair with all local schools. Carrying this project forward brings with it some

unique opportunities. The ability for this type of event is to raise awareness, build practical life skills, and teach students about wicked problems and energy use is something unique in the area. By implementing the energy fair concept across the school systems, students will have a chance to voice their opinion and create solutions to issues that affect the entire community. Allowing students to have a voice and involving them in small projects may not appear significant in the greater concerns of energy issues, but we should not underestimate the power of tipping points. It is hopeful that an environmental tipping point will be created in the region that will reverse the vicious cycle of energy use to a virtuous cycle of energy savings (Marten, Brooks, & Suutari, 2005). We hope that by viewing our project as a small experiment, (Kaplan, Irvine, 2001) SEEDs can use this to their advantage in continuing their goal of creating one big energy/science fair where all schools can be involved. Energy fairs are a great way to contribute to the overall goal of a more energy efficient society. Through little community steps we create big community steps, through big community steps we create little world steps that eventually add up to progressive movements forward into a sustainable world.

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