**SMILE High School Challenge (HSC): Survey Design**

**HSC Survey Goal:**

“Goal: To gain a deeper understanding of your local community’s knowledge of Bioenergy, and attitudes regarding the perceived impacts of bioenergy (e.g. job creation, sustainability, environmental concerns, national energy independence) to inform potential U.S. bioenergy investment.”

**HSC Challenge Summary:**

At the HSC students will be divided into groups to develop a presentation to inform potential bioenergy investment into a fictitious community. The information used to create the fictitious community will be taken from the surveys your students conduct, and that data will be supplemented with regional, agricultural, and city data. Students will use and interpret these data sets to inform investors whether or not bioenergy would be a mutually beneficial investment for the community and for investors, what might the investors have to do to gain community support, and what type of feedstock would be appropriate for the community investment and why.

**Lesson Summary:**

This lesson walks students through small group discussions that tease out the goal of the HS challenge. This lesson will aid students in deconstructing the goal of the challenge and identifying their target population in order to develop possible survey questions for the HS challenge. The key constructs of the survey are knowledge of bioenergy, job creation, sustainability, and national energy independence. In this lesson, the students will cover Likert survey design, develop one additional question per construct, and go over how to conduct their survey with a participant.

**Materials:**

1. Scratch paper and Pens/Pencils
2. Display/Printouts of Current questions
3. Display/Printouts of Bioenergy Definition
4. HSC PowerPoint
5. HSC Survey template
6. HSC excel results template

**To Conduct Survey:**

1. Survey Printouts (5-10 per student)
2. Clipboard or hard surface for participants to write on
3. Pen/Pencil for participants to use

**Knowledge and Skills developed:**

1. Students will be able to develop good questions for a self-conducted Likert opinion survey.
2. Students will gain experience conducting social research by conducting the survey and recruiting participants.
3. Students will gain experience communicating science to a general audience.
4. Students will become knowledgeable about their communities opinion and knowledge of bioenergy.

**Teacher Background Information:**

Bioenergy is energy taken from biological processes, such as wood pellet stoves, ethanol (E80) in automotive fuel, using animal waste (e.g. methane) as an alternative to natural gas, or using poplar trees to make jet fuel.

This lesson will draw on your experiences at this past Teacher Workshop. This lesson is to help your students develop **5 additional questions** to add to the 5 stock questions you and your fellow teachers developed at the workshop. It is important to review the lecture slides and to keep the end in mind (e.g. to inform an investment presentation) and to keep an eye on the scale of the project (e.g. we want this to be challenging for students but there is also a deadline to turn in the results of the survey). Also, if your students would like to interpret their own results, be sure to download the excel HSC\_Results.xls template.

**Introduction:**

Let the students know that in preparation for the HSC they will be conducting a social research project to inform potential bioenergy investment in their community. At the HSC, they will be meeting with students from other clubs to design the specifics (e.g. wording, framing, or activities) of the investment presentation. The survey will help them to inform the investors about their local communities understanding of bioenergy, attitudes towards bioenergy, the perceived impacts of bioenergy on their community, and what aspects of bioenergy the community may need to be made aware of. This information collected from the survey will help the students frame the presentation they design at the HSC.

This kind of survey experience is very similar to marketing and outreach research done by public and private corporations (e.g. political, advocacy, and awareness campaigns). In education, this type of research design is similar to formative assessment that a teacher collects informally or formally during class to inform the design of future lessons.

**The Core Lesson:**

On a white board/power point slide/overhead projector please display the goal of the HS Challenge:

“Goal: To gain a deeper understanding of your local community’s knowledge of Bioenergy, and attitudes regarding the perceived impacts of bioenergy (e.g. job creation, sustainability, environmental concerns, national energy independence) to inform potential U.S. bioenergy investment.”

Tell the students that in order to inform the investment, a survey is needed to gain a deeper understanding about their communities understanding of bioenergy and related values. Let the students know that they will be using a Likert style survey. At this time, you may want to discuss with them what kind of surveys they have filled out and if they have completed a Likert survey before. If possible, you may want to provide them with examples of the types of questions (e.g. multiple choice, Likert, yes/no, free response, etc.) to help students understand the broad range of survey types.

Explain to the students that we are using a Likert survey because it is helpful when researching preferences, attitudes, and values. Show students the HSC survey template. Point out that each question relates to a construct from the goal, and they will need to develop one additional Likert question per construct. A construct is an idea or concept that the survey would like to gather data about. In this case, the concepts are taken right from the goal: Knowledge/Understanding of Bioenergy, Sustainability, Environmental concerns, Job Creation, and U.S. Energy Independence.

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| --- | --- |
| Question | Construct and Scoring |
| 1. I know a lot about bioenergy. | Knowledge/Understanding of Bioenergy  Most Affirmative: SA = Strongly Agree (5), A = Agree (4), U = Uncertain (3), D = Disagree (2), SD = Strongly Disagree (1) |
| 2. Using renewable energy is important to me. | Sustainability  SA = Strongly Agree (5), A = Agree (4), U = Uncertain (3), D = Disagree (2), SD = Strongly Disagree (1) |
| 3. Bioenergy is better for the environment than fossil fuels. | Environmental Concerns  SA = Strongly Agree (5), A = Agree (4), U = Uncertain (3), D = Disagree (2), SD = Strongly Disagree (1) |
| 4. Bringing Bioenergy companies to our community is a good way to create new jobs. | Job Creation  SA = Strongly Agree (5), A = Agree (4), U = Uncertain (3), D = Disagree (2), SD = Strongly Disagree (1) |
| 5. The United States needs to be energy independent. | Energy Independence  SA = Strongly Agree (5), A = Agree (4), U = Uncertain (3), D = Disagree (2), SD = Strongly Disagree (1) |

Point out that these questions are all written to have 5 as the most affirmative answer, ask students – How could you reword the question to have 5 be the least affirmative answer (e.g. flipping the question)?

Ex: 1. I know a lot about bioenergy.

If the participant selects SA = 5, that means they think they know a lot.

Now: Flip the question so that SD = 1 means that they know a lot.

How would that question look?

Possible Flipped Question: I do not know a lot about bioenergy. Or, I have never heard of bioenergy.

Now ask the students to think about: Why is it useful to have more than 1 question addressing the same construct?

Answer: This helps to check reliability of a participants answer, as well as to gain more information about the construct.

Let the students know that they can choose to write questions that are flipped, but not directly related to a question already on the survey. Another question addressing understanding of environmental concerns could be:

Ex: Bioenergy is more harmful to environment than using fossil fuels.

In this case, SD would be the most affirmative to support bioenergy and be a score of 5.

Tips for Writing Good Surveys:

1. Use simple language.
2. Think about the numerous ways you could interpret the question
3. Do not attempt to address to issues with one question (e.g. double barreled).
4. Be sure to pilot your survey with peers before you use it to collect data.

Tips for Ordering Questions

1. Order questions in logical order; keep questions that ask the same things together.
2. Order question with easiest questions first.

Discussion

Depending on the number of students, break them into small groups to have each group work on creating one question for one construct. Have each group share out to the large group and post their question somewhere visible for everyone to see. Have each group review all of the questions and give feedback to other groups. After the discussion, decide on the ordering of questions, print questions, and set a timeline to pilot, (then edit the survey – if needed) and then set a timeline to conduct the surveys and collect the results.

Note: Your club can only add 5 more Likert questions. But they can add other multiple choice, free response, true or false/yes or no, and ranking questions if they would like. These extra questions may be used as the HSC depending on the results.

Interview Protocol

After the survey has been finalized and before the survey is piloted, have your students brain storm how it will feel to approach a friend, family, or neighbors to complete the survey. Have them create a step by step of how they should approach, greet, and explain what the survey is about and why you want them to complete it. It may be helpful to role play between students as researcher and participant, and it may be useful to create a formal step by step interview protocol.

Data Recording

If you would like to record your groups data, please use the HSC\_SurveyResults\_Templace.xls available on the SMILE blog (http://blogs.oregonstate.edu/smile/). The 5 stock questions are already entered on the sheet, but please enter your additional questions. After the results and questions are entered onto the spread sheet, you may email it and a copy of your survey to the SMILE office.

Manipulating/Interpreting Data (Optional\*)

This section is only if you would like to manipulate and interpret the data your students collect with them. Have them create a raw file of the spread sheet to save data as is, then create a working file to save as you begin to manipulate and save the data. You can run descriptive stats and reliability checks on the Likert questions (check youtube.com for tutorials). If you add an open-ended question, you may want to do a word analysis and sort responses by like or similar responses to see if there are any similar or conflicting patterns within the data. Also, even though you are interpreting the data with your students please send in your scanned copies, hard copies, or electronic results to SMILE. This is to make sure that all data is collected by Spring Break for SMILE to provide at the HSC.

**Due Date:**

Survey results MUST be sent back to the SMILE office before Spring Break.

Send electronic results and a copy of your club’s final survey via email to renee.oneill@oregonstate.edu. Send hardcopy paper completed surveys to the SMILE Office via standard mail at 18 Gladys Valley Ctr. Corvallis, OR 97333.

Be sure to send:

1. A copy of you clubs final survey to send electronically or by standard mail.
2. The completed surveys if sending in by mail.
3. The excel sheet if sending in electronically.

**Resources:**

SMILE HSC Power Point on Survey Design

SMILE HSC Survey Template

SHILE HSC Excel Results Template

University of Wisconsin, Survey Fundamentals

http://oqi.wisc.edu/resourcelibrary/uploads/resources/Survey\_Guide.pdf

Survey Design Videos by Survey Monkey

https://www.youtube.com/playlist?list=PLiTGWc0Er5wfRNls-4Zpir4p5yUR6CLw7