Amplifying Unheard Voices: Energy Literacy as a Path to Equitable Stakeholder Participation

Ms. Naomia A. Suggs-Brigety, The George Washington University

Naomia is conducting research on energy equity. Naomia graduated from Jackson State University, an HBCU in Mississippi, with a bachelor's degree in Civil Engineering. After working for the Mississippi Department of Transportation, she shifted into policy working in the U.S. House of Representative on U.S. – Africa relations, global health and international development. Naomia also has a master's degree from the Elliott School of International Affairs in International Development Studies specializing in Sustainable Urbanization.

Prof. Saniya Leblanc, The George Washington University

Saniya LeBlanc is an associate professor in the Department of Mechanical & Aerospace Engineering at The George Washington University. Her research goals are to create next-generation energy conversion technologies with advanced materials and manufacturin

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Objective

This research aims to increase the ability of marginalized communities to engage with stakeholders in the energy transition. Researchers employed an energy justice framework to develop a six-week summer program designed to enhance energy literacy. The study gathers information on methods for bridging knowledge gaps within marginalized communities regarding the energy transition. By incorporating social science and engineering education methodologies, the research created a program capable of addressing community-identified needs while simultaneously answering research questions on energy literacy, thereby producing information necessary for an equitable energy transition. Notably, this research showcases the use of community partners to improve research design and increase community participation by lowering trust and communication barriers, ultimately magnifying the reach of energy literacy efforts.

Study Roadmap Utilizing an exploratory sequential design to build a tool based on the specific community assets and needs. [1]

Phase		Procedure		Product
Qualitative Data Collection		Key Informant Interviews [Community Partners, Community Leaders, Property Management] Site Visited [N = 4] Event Attendance [N = 8]	•	Text data [field notes, community partner materials, event write-ups] Image Data [photographs]
Qualitative Data Analysis	•	Open Coding Researcher Discussions	•	Identified Community Needs Identified Community Assets
Development Phase	•	Asset-based Design Assess capacity to support community need Assess capacity to utilize community assets	•	Implementation Site Selection [N = 1] Energy Justice and Literacy Instructional Template
Quantitative Data Collection	•	Weekly Instruction by Age Group Formative Assessment Photographs	•	Garden Revitalization Student Notebooks [drawn images, list, bar graphs, short answers]
Quantitative Data Analysis	•	Frequencies Summative Assessment	•	Descriptive Statistics
Integration of Results	•	Interpretation and explanation of quantitative and qualitative results	•	Discussion Implications Roadmap for Adult Engagement

Figure 1: Study diagram showcasing planned QUAL-> QUAN analysis.

Acknowledgements

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Naomia A. Suggs-Brigety and Dr. Saniya LeBlanc The George Washington University **Department of Mechanical and Aerospace Engineering**

Site Overview

Highland Dwellings, a DC Public Housing Complex, is situated in a census tract that the U.S. Department of Energy (DOE) has identified as disadvantaged. [2] The tract is below the DOE threshold for energy disadvantage while having high energy



Figure 1: DOE Justice40 map of Highland Dwellings showing demographics, inequality categories and energy inequality percentiles.

Community Based Participatory Research (CBPR)

- CBPR prioritize human-centered design through iterate engagement with and feedback from the community. [3] [4]
- Researchers are engaging as participant observers to allow for introducing, teaching and recording data.
- Through key informant discussions learned of desire to revitalize community garden.
- Attendance at on-site events allows for evaluation of community needs and assets.



Figure 2: Photos of Highland Dwellings, community garden, exterior of community center and play/activity area

Energy Literacy as a Path to Energy Justice

To fully realize the potential of all pillars of energy justice for marginalized communities requires a shared language between communities and decision-making stakeholders. [5] [6]



Figure 3: Equity take home materials for students describing and visualizing areas of consideration necessary for energy justice The pillars supporting energy literacy – economic, political, environmental and social – social factors are the least understood due to the complexity in conducting in vivo analysis.[7]

Instruction Design

Weekly lesson plans guides are crafted based on the DOE Energy Literacy objectives and Next Generation Science Standards (NGSS). [7] [8]

	G	I II		Lesson	n Plan Guide	
Team Leader(s): Naomia A. Suggs-Brigety, Undergraduate Student		Jndergraduate	Element: Energy Literacy 6.6 Behavior and des energy used by human society. NGSS K-2-ETS1 Engineering Design	Length: 50 minutes		
Day/Time of MM/DD/Y	Lesson: YYY		Lesson Name: How do you Use En	ergy? (5-8 year-olds)	# of Students: 15	
Activity	Time	Wh: (include "check	at are YOU SAYING? for understanding" questions)	What are YOU DOING?	What are APPRENTICES DOING?	Skills Prompting
Hook/Intro	5 min	"Good Morning!" "How are we doing "Who remembers y	? /How was breakfast?" vhat we discussed last week?"	Focusing students for start of session	Settling in, getting notebooks	Transitioning, Listening
Mini- Lesson	10 min	"Who can remind n learned last week?" (If need: "The first "And what do plant "Great job summar 'Using what we leas energy we are goin our homes"	e of some of the terms we part is another word for picture") s use photosynthesis for?" izing what we did last week!" med about how plants and g to look at how we use energy in	Introducing new topic, discussing topic connections	Listening, looking at example figures/pictures	Listening, Ask questions
Activity #1 (in building)	15 min	"In your notebook ; (If any new studen them a notebook) "On there you will ; you have in your h "If you have any qu	you will see a worksheet." Is the undergrad will prepare See pictures of energy users that ome" estions raise your hand"	Passing out materials, answering student questions, providing examples	Completing activity independently	Simple Sketch/Drawing
Transition	5 min	"Okay, 30 seconds "Pass your noteboo "Let's line up at the and see what've ha community garden	to finish up what you are doing." ks in and put all materials away." door and get ready to go outside we been talking about in the "	Collecting materials, guiding line up, safe transition to garden site	Following instructions	Transitioning, Listening
Activity #2 (in garden)	15 min	"We are going to se and rotate through "How are the plant "What can you tell making energy?" "What are they usin	parate you into groups of 3 or 4 the garden beds." s different from last week" me about how the plants are ng this energy to make?"	Supervising students and monitoring site, Directing support staff, guiding students through bed inspection, through garden care	Exploring the garden, interacting with plants and garden beds	Make observations
Transition	5 min	"Finish your activit	y and line up at the gate."	Safe transition to community center	Following	Transitioning

	G	XV		Lessor	n Plan Guide	
Team Leader(s): Naomia A. Suggs-Brigety, Undergraduate Student			Element: Energy Literacy 6.6 Behavior and de energy used by human society. NGSS 3-5-ETS1 Engineering Design	Length: 50 minutes		
Day/Time of Lesson: MM/DD/YYYY			Lesson Name: How do you Use Energy? (9-12 year-olds)		# of Students: 15	
Activity	Time	Wh (include "check	at are YOU SAYING? for understanding" questions)	What are YOU DOING?	What are APPRENTICES DOING?	Skills Prompti
Hook/Intro	5 min	"Good Morning!" "How are we doing? /How was breakfast?" "Who remembers what we discussed last week?"		Focusing students for start of session	Settling in, getting notebooks	Transitioning, Listening
Mini- Lesson	10 min	"Who can remind r photosynthesis pro (If need: "What thi photosynthesis?") "And what do plan! 'Using what we lea glucose we are goin in our homes"	ne of the parts of the locess we learned about last week? ngs do plants need to undergo is use photosynthesis for?" rned about how plants and ng to look at how we use energy	Introducing new topic, discussing topic connections	Listening, describing process, looking at example figures/pictures	Listening, Ask questions
Activity #1 (in building)	15 min	"In your notebook (If any new studen them a notebook) "On there you will "If you have any qu	you will see a worksheet." ts the undergrad will prepare see a blank bar chart" estions raise your hand"	Passing out materials, answering student questions, providing examples	Assessing usage, Completing activity independently	Quantitative measuring
Transition	5 min	"Okay, 30 seconds to finish up what you are doing." "Put materials away but keep your notebook." "Let's line up at the door and get ready to go outside and see what've have been talking about in the community garden."		Collecting materials, guiding line up, safe transition to garden site	Following instructions	Transitioning, Listening
Activity #2 (in garden)	15 min	"We are going to se and rotate through "How are the plant "What can you tell making energy?" "What are they usin	eparate you into groups of 3 or 4 the garden beds." s different from last week" me about how the plants are ng this energy to make?"	Supervising students and monitoring site, Directing support staff, guiding students through bed inspection, through garden care	Exploring the garden, interacting with plants and garden beds	Make observations, record observations
Transition	5 min	"Finish your activit "Pass in your noted	y and line up at the gate." books."	Safe transition to community center	Following instructions	Transitioning

Figure 4: Lesson Plan Guide samples by age group outlining topic review, mini-lecture and experiential learning activity

Learning reinforcement can be achieved through weekly take-home activities.



Figure 5: Weekly take home activities by age group designed to encourage at home discussion

To support the recall of researchers, photos are taken at various stages of garden revitalization. Each student was a provided with a notebook maintained by researcher between weekly meetings.

Figure 6: Student in-session activity sheets collecting information on energy usage in their homes by age group

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Data Collection

The evolving nature of the analysis requires detailed field notes from all participant observers. [3]

WHO USES ME?



Conclusion

A mixed method approach strengthens the ability of researchers to conduct in vivo analysis: include community members, understand community assets and creation of a unique tool.

This project strengthens trust by supporting community identified needs increasing the support for future activities.

In future studies researchers will have stronger theory formation through exposures to hard to acquire information.

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