A core principle in Community-Based Participatory Research (CBPR) is a bidirectional flow of information between investigators and community. We have extended this paradigm to include a team of Clinical Research Knowledge Brokers, trained in CBPR and Health Sciences, to high-school STEM teachers/club mentors and to youth in high school science clubs. Each student club conducts CBPR projects on relevant health issues in their neighborhoods. In principle, diffusion of knowledge occurs at each step between each team member’s science and cultural perception. Each study uses a series of experiential processes to consider evidence based on actual community needs, identify gaps, pose testable questions, design research project, conduct, organize, analyze, interpret, and present the study with attention to the disconnect between the science and cultural perception, because the work is being done by the most non-threatening team member - the high school student. We report on an unexpected consequence of this model. STEM teachers, especially lay educators without prior formal training in Health Sciences, have little experience of teaching content of these topics chosen by the students. New changes mandated in STEM education now emphasize experiential education. CBPR provides such an opportunity by teaching new concepts, not only for the student but also for their teachers/mentors. We illustrate this process where a club teacher, initially hesitant to go beyond their prior level of comfort, has been encouraged to learn and mentor new concepts. As designated times, sharing of the project with the program team, provides teachers mentoring in new fields. In a bi-directional flow of information, the teacher leads the student through the process of a project. In return, the student leads the teacher to new fields and skills. This boomerang flight of learning is an interesting inversion of classical education. It is proving highly attractive to participating teachers.

The concept of a boomerang, where the teacher teaches students and then in the process the student teaches the teacher, fosters bidirectional flow of information to lead to a behavior change in both the student and the teacher. This powerful model being developed in Pittsburgh was first envisioned during a collaborative initiative with The Health Science and Technology Academy (HSTA) in West Virginia and is heavily dependent on the involvement of the Allegheny Intermediate Unit and their influence and expertise in the Pittsburgh Public Schools.

### ABSTRACT

A core principle in Community-Based Participatory Research (CBPR) is a bidirectional flow of information between investigators and community. We have extended this paradigm to include a team of Clinical Research Knowledge Brokers, trained in CBPR and Health Sciences, to high-school STEM teachers/club mentors and to youth in high school science clubs. Each student club conducts CBPR projects on relevant health issues in their neighborhoods. In principle, diffusion of knowledge occurs at each step between each team member’s science and cultural perception. Each study uses a series of experiential processes to consider evidence based on actual community needs, identify gaps, pose testable questions, design research project, conduct, organize, analyze, interpret, and present the study with attention to the disconnect between the science and cultural perception, because the work is being done by the most non-threatening team member - the high school student. We report on an unexpected consequence of this model. STEM teachers, especially lay educators without prior formal training in Health Sciences, have little experience of teaching content of these topics chosen by the students. New changes mandated in STEM education now emphasize experiential education. CBPR provides such an opportunity by teaching new concepts, not only for the student but also for their teachers/mentors. We illustrate this process where a club teacher, initially hesitant to go beyond their prior level of comfort, has been encouraged to learn and mentor new concepts. As designated times, sharing of the project with the program team, provides teachers mentoring in new fields. In a bi-directional flow of information, the teacher leads the student through the process of a project. In return, the student leads the teacher to new fields and skills. This boomerang flight of learning is an interesting inversion of classical education. It is proving highly attractive to participating teachers.

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### COMMUNITY BASED PARTICIPATORY RESEARCH LEARNING PARADIGM (CPL)

- **Potential to Enhance Health**
- **CBPR Learning Paradigm**
- **Evolution of Process**
- **Local Descriptive Projects**
- **Statewide Descriptive Projects**
- **Collaborative Statewide Intervention Projects**
- **Cross State Community Adaptation**

### EVOLUTION OF PROCESS

1. **Local Descriptive Projects**
   - Diabetes: Project title: Diabetes Survey
   - Diabetes: Diet Study

2. **Statewide Descriptive Projects**
   - Hemoglobin A1c: Project title: Hemoglobin A1c Survey
   - Asthma: Project title: Asthma Survey

3. **Collaborative Statewide Intervention Projects**
   - Diabetes: Project title: Diabetes Education Project
   - Asthma: Project title: Asthma Education Project

4. **Cross State Community Adaptation**
   - Project title: Cross State Community Adaptation Project

### TIERED DIFFUSION MODEL OF LEARNING

The CPL was designed to provide a structured process to foster a self-help solution to the clinical problem of obesity in a dispossessed rural community. Our current contention is that these same principles will also work in an urban setting (Pitt Bridge Project) that share the features of being ethnic minorities, being poor, or coming from a family without a tradition of having members with higher education.

CPL is a fundamental inversion of traditional approaches to learning. Conventionally, the adult teaches the child. Our goal is for the adolescent to teach the adult. This is achieved by exciting experiential processes. Each study uses a series of descriptive projects, so that adolescents become more invested in an activity if they are involved in the identification of those research questions that organize the design of the principles and structure of CBPR. In order to guide this process, we have adopted a Tiered Diffusion Model for Bi-Directional Sharing of Information and Culture.

CPL involves interactive learning where STEM Teachers teach the process of science, and STEM Teachers health science. This premise is extendable and adaptable to multiple communities and neighborhoods wanting to engage their youth in self-help mentorship.

### ACKNOWLEDGEMENTS

Allegheny Intermediate Unit 3’s (AIU) guidance and development and implementation of their mission to maximizing educational opportunities for all learners by responding to the needs of our community with leading-edge, high-quality, cost-effective programs and services. Through the AIU Vision that educational excellence is a hallmark of our region with all learners having access to the best services, enriching their lives and enabling their contribution to a vibrant economy.

The Health Sciences and Technology Academy (HSTA) along with their governing body known as the Joint Governing Board and their mission to increase the number of African American and underrepresented students in West Virginia, who pursue degrees in Health Sciences and Science, Technology, Engineering, and Mathematics (STEM) majors, thereby increasing the number of health practitioners and advocates in the medically underserved communities of West Virginia.

### REFERENCES

- Branch R., Chester C., Community Based Participatory Research on Science and Science, Technology, Engineering, and Mathematics (STEM) majors, thereby increasing the number of health practitioners and advocates in the medically underserved communities of West Virginia.

### Health Science Clubs for Minority & Disadvantaged Students

| Health Science Clubs for Minority & Disadvantaged Students (10 Students/Club) |
|---------------------------------|-----------------|
| **Health Science Technology**   | Pitt-Bridge Program Academy |
| **Rural Statewide**             | Urban Pittsburgh |
| **Location**                    | Pennsylvania Virginia |
| **Counties**                    | Allegheny County 26 |
| **Number of Clubs**             | 78 | 5 (in development) |
| **% Minorities in Communities** | 3% | 14% |
| **% Minorities in Clubs**       | 34% | 100% |
| **Number of Mentors in Clubs**  | 1 | 2 |

### Cross State Community Adaptation

- **Booster community model of learning**
- **Adolescent-focused model**
- **Mentor teaches students for process of research**
- **Project provides opportunity to teach interest about obesity**
- **Urban (Pittsburgh) vs. Rural (IA, WV)**
- **Youth teaching to kids in starting career programs**
- **Youth mentoring non-profits**
- **Students will be more involved in the community to local neighborhoods**

### Student projects provide opportunity to teach mentors about health science topics