



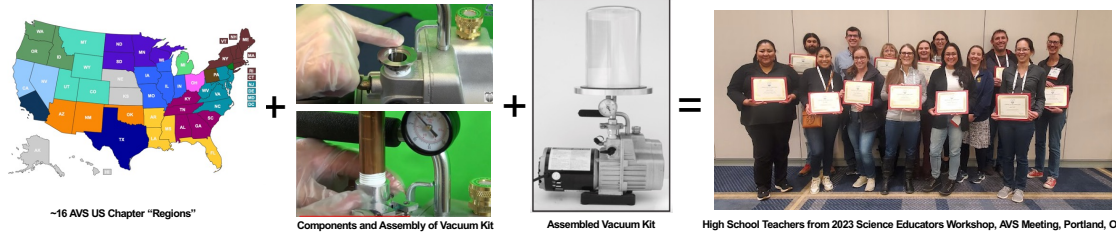
# Concept Development to Expand Vacuum Technology Course Content for Secondary Education in Historically Underserved Communities (HUCs)

Timothy Gessert<sup>1,2</sup>, Svitlana Pylypenko<sup>3,4</sup>, Sean Jones<sup>5,6</sup>, Justine Harren<sup>7</sup>, and Susan White<sup>8</sup>

<sup>1</sup>Gessert Consulting, LLC (Conifer, CO) <sup>2</sup>Chair - AVS Education Committee, <sup>3</sup>Colorado School of Mines (Golden, CO)  
<sup>4</sup>Chair - AVS Science Educators Workshop, <sup>5</sup>National Science Foundation, <sup>6</sup>Past Chair - AVS Diversity, Equity, & Inclusion Committee,  
<sup>7</sup>American Association of Physics teachers (AAPT), <sup>8</sup>AIP Statistical Research Center



## History and Background – ~30 Years of AVS Science Educator Workshop (SEW) = ~500-1000 Kits in US High Schools



For ~30 years, the AVS has offered training to groups high school teachers in vacuum technology through the Science Educators Workshop (SEW). The SEW also provides the teachers with a small vacuum system for demonstrations in their classrooms. The training occurs at the annual International Symposium of the AVS, with travel and lodging paid for by a combination of funds from National AVS Education Committee, and Regional AVS Chapters. It is estimated that between 500-1000 kits have been distributed to high-schools across the US in the past ~30 years.

## Initial Concept – Expand SEW to “Historically Underserved Communities” (HUCs)

The AVS SEW is viewed as a important educational outreach activity of the AVS. Still, discussions with SEW-participating teachers over many years has suggested that the majority of teachers come from relatively well-funded schools. Additional insight from SEW committee members, and regional chapters members who have participated for many years in various “Science Fairs”, has suggested that while some school districts strongly encourage continuing education such as the SEW for their teachers, others are much less able to do so due to financial constraints. These realizations suggested that the SEW should consider attracting more teachers from these “Historically Underserved Communities” (HUCs).

The resulting AVS/AIP Venture Fund proposal had 3 goals: (1) Understand the locations and needs HUCs better; (2) Determine how the AVS SEW might be able to reach out to HUCs more effectively; and (3) Understand how the SEW might modify its content and delivery to better address HUC needs. The AVS VF Team included members from the AVS Education, SEW, and DEI Committees. Within these AVS Committees is representation from institutions with strong interest in STEM Education (e.g., Academia, NSF, etc). Team Members also have included the AIP/AAPT UToP Program, and the AIP Statistical Research Center.



## Year 2-3 – Consideration of this VP Project with US Chips in Science Act

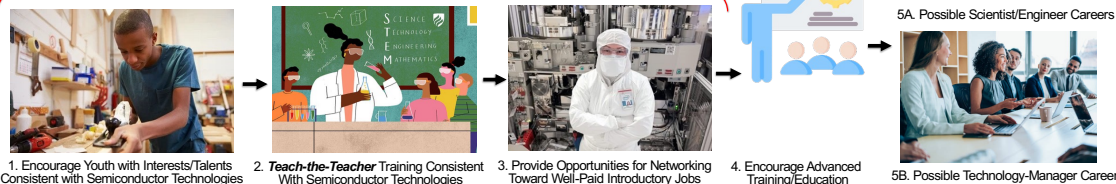
**Chips Background:** The *Chips in Science Act (Chips)* was signed into law in Aug. 9, 2022. Ramifications of *Chips* with the AVS/AIP project became immediately apparent. *Chips* seeks to re-establish leadership in US semiconductor manufacturing, and will require significant training activities to be re-established/upgraded in the US, and will include everything from K-12 through graduate-school STEM education. *Chips* also recognizes that communities that have been historically underrepresented in the Semiconductor Industry must be more effectively included.

**These Chips goals align almost perfectly with the goals of this AVS/AIP Venture Fund Project** - that was proposed one year earlier!

**Present Chips Considerations for AVS and this Venture Fund Project:** One goal of Chips is to train new technologists (up to 300,000?! for an expanding US semiconductor industry, while also increasing involvement from HUCs. An example of one 5-part **training concept** is illustrated below. Although AVS has had involvement in all these training steps, it can be suggested that AVS involvement has been historically focused primarily in Steps #4 and #5. One concept being considered through this VP Project is to explore how the AVS can become more involved in Steps #1 - 3, while also improving our outreach to HUCs.

### Potential AVS Opportunity Areas?

### Much of AVS Historic Outreach Areas



## Year 2-3 – Development of HUC Program Ideas & Venues

Recent project activities have included identifying locations where various types of programs aimed at different types of HUCs might be tested. Although discussions are ongoing with all of these (and other) entities, the following suggests some present directions:

### Girls Leadership Academy of AZ (GLAAZ/CPLC), Phoenix, AZ

Discussions have been proceeding since GLAAZ faculty participated in the AVS69 SEW (2022). Recently, the AVS Student Chapter at Colorado School of Mines (MAVS) has agreed to conduct a “science fair” program at location(s) in AZ. These would not only demonstrate exciting new technology areas to historically **underserved Hispanic youth**, but importantly, expose participants to **young** graduate students who are pursuing STEM careers.



### Ignition Lab, Kansas City, KS

This opportunity resulted from discussions with AVS Professional Leadership Committee (PLC) members of who are volunteering with **underserved urban youth** in Kansas City.



### Maine Discovery Museum, Bangor, MA

Opportunity originated with an AVS Board member from University of Maine, and is proceeding with museum staff involved in STEM programs for **underserved rural youth** in Maine.



### Normandale Community College, Bloomington, MN

This is one example of a US Community Colleges who wishes to participate in the AVS Science Educators Workshop. It has been realized that expanding SEW outreach through Community or Technical Colleges - could be an effective and underappreciated method toward the **“Teach-the-Teacher”** part of this VP project.

## Concept Development (or Re-Development) Results

Year 1 data-analysis provided clear evidence that STEM education in certain urban area could benefit significantly from AVS SEW-type outreach (one initial direction proposed for this project). However, it is now realized that outreach to these HUCs is more difficult than anticipated, especially following COVID, and related US teacher shortages. Further, even for HUC’s who are very receptive to an AVS SEW outreach, considering school and instructor schedules, age of participants, and different regional focus, program logistics are more involved than those of the historic SEW (where the SEW occurs at the AVS International Symposium, and SEW content is aligned with a knowledge base consistent with US high-school teachers). With these considerations, Year 2-3 of the VP Project is pivoting to explore testing much smaller/custom outreach activities than initially envisioned, and with several different types of HUCs regions. It is hoped that these smaller test programs would provide needed insight regarding different HUCs have similar needs that the AVS could broadly address, and/or how the HUC SEW concept might influence considerations of AVS participation in Chips for Science Act programs.

## Additional Acknowledgements

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- Eric Joseph – IBM Corporation (Chips Advice)
- Dave Adams – AVS Current President
- Michael Williams – AVS Immediate Past President

