

Example ACS-Hach High School Chemistry Grant Proposal Laboratory Equipment and/or Supplies

Student Impact

700

Collaboration

Yes. I would like to use these modeling kits to expand our explanations of chemical structure, function and bonding. Other chemistry teachers who will use these kits [REDACTED]. Each teacher would get to use these kits in lecture and laboratory situations to stimulate interest among our tactile and visual learners.

Proposal Summary & Goals

We currently teach students about chemical bonding, structure and function. I hope to include these modeling kits in our lectures and labs. In my vision, student partner groups would each get a kit to use to illustrate chemical shapes. These models would also help illustrate bond angles, hybridization and polarity. We currently have 20 kits, but these are shared in classes containing 30 students, so it becomes very difficult to explain the lab concepts because each student does not have a model to observe. Having more kits and the electron "dots" will help demonstrate how molecules are made.

Description

As I stated above, we have taught molecular structure, function and shape ever since I began teaching chemistry. However, as our number of students with language barriers increases and enrollment in our classes rises above thirty students per class, we find that explaining concepts with pictures and notes is just not sufficient. Instead, providing students with tactile stimulation like models allows for all students to be involved and to learn chemical concepts in their own way.

This year I have been selected as the level leader, or coordinator, of our regular level chemistry classes. I also have the honor of teaching one class of AP chemistry students. In my opinion, all levels of students can benefit from tactile learning. I would like to be able to provide each student in the classroom with a model kit throughout the year.

We currently have 20 modeling kits for use among seven teachers and about 700 students. You may be able to imagine the frustration of sharing so few materials and organizing who gets to use them each day. Adding 30 modeling kits and sets of electron dot models to our current supply would greatly facilitate our instruction and length of time each teacher could use the models.

I fully plan to include these models in my regular chemistry class as we discuss topic like:

- covalent and ionic bonding
- the formation of ions
- the shape of water and its polarity
- the shapes of common molecules including tetrahedral, trigonal planar, linear and others
- electron transfer during ionic bonding
- sharing electrons during covalent bonding
- hybridization of orbitals

These are just some of the ideas and topics that I think will be affected by having modeling kits. From upper level AP chemistry down to the struggling student who just can't seem to understand, these models will have a huge impact on understanding and remediation of science misconceptions. In terms of the future, incorporating these models into our existing classroom structure should be relatively easy. We already use models in two of our labs; we can now use them to build structures used

in the lab so that students can understand on a molecular level what is happening in their flask. Once incorporated, I see the use of modeling becoming a great way of teaching. All of my co-teachers who I have talked with about this grant are so excited to expand our supply of models and to use them more often in our lectures and explanations. As the level leader, I will continue to write and modify existing activities to include the new materials.

Outcomes

There have been extensive amounts of research done about student learning styles. As teachers, we realize that not all students respond to traditional verbal lectures or dry diagrams. I believe that placing a model in the hands of a student takes a chemical concept from the abstract to the understandable. I have been using "water kits" for the past two years to help my students understand solubility and structure and the comments I hear from them are encouraging enough for me to continue to add to my model collection. My students say that they like to see things in front of them that they otherwise would have to visualize. They also enjoy breaking away from the traditional means of learning to manipulate something other than their pencils.

The other main way that I see these models improving student learning is by providing a means of communicating in a meaningful way with my English-language learners. I have seen an increase in interest and understanding among my ESL students as I have worked to include more models in my classroom.

Evaluation

As a means of measuring progress, I plan on comparing this year's labs and tests to the scores next year. I also keep a running journal of activities and strategies that work and those that don't. I will continue to add to this journal and document student comments on the use of the models.

I hope to see an increase in lab and test scores and a decrease in the amount of remediation and tutoring required for some of my more difficult topics. I also plan on working with the other teachers on my team to continue to implement and document our progress.

Grant Amount

\$860.00

Budget

Item	Description	Number Needed	Total Cost
Wire-Rimmed Counting Chips	Magnetic plastic chips used to represent electrons. Can be used on the white board or by students on a table top.	5	\$28.25
Organic Small-Group Model Kits	54 piece molecular model set with parts sufficient to build all molecules included in our school/state curriculum.	30	\$760.50
Inorganic/Organic Teacher Model Set	Modeling set for teacher use. Includes pieces to make all molecules and formula units described by our curriculum.	1	\$51.60
Total Without Shipping Costs = \$840.35			
Estimated Shipping = \$20.00			