"Partnership in Astronomy"

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The "Partnership in Astronomy" program of the AAVSO, the forerunner of AAVSO's *Hands-on Astrophysics*, and other school educational initiatives, began as a wish of Dr. Janet Mattei to bring real astronomy and improved science education to the classroom. It began in early 1990 with Janet and Michael Mattei visiting for a dinner engagement at my home. The conversation began with my wife Joyce Motta, a former early childhood teacher before her law degree took her in a different direction, decrying the sad state of science education for K–6 grade children. She then made a reference to my volunteering to give astronomy lectures at our local elementary school, and how well it was received by the teachers in the school system. Janet became quite interested in this, and described how bringing astronomy education to schools had been a major interest of hers, and how she had thoughts along those lines herself. Before I had any inkling of what was happening, what I thought was a bit of local volunteering on my part was about to expand dramatically under Janet's tutelage and vision.

As Janet and Mike were leaving for the evening, Janet stated that she would be looking into how to structure such science enhancements for local schools to make them more generally available, and possibly looking into funding and support. Not really believing this would go much further than some local volunteering, I wished her well, and bid her good night. Little did I know what was about to unfold under her determined planning on this matter. A few weeks later I received a telephone call from Janet at AAVSO headquarters, stating that she was about to put in for a grant to set up a method to get amateur astronomers into classrooms to aid in astronomy education. She also stated that we would need to meet "in the near future" to develop a manual to give structure to this educational effort and to have children do science projects. The ball was rolling, and I was still unaware of how strong Janet's "pitch" was. Sure enough, when Janet set her mind on something, things happened.

Shortly afterwards we received word that grants from NASA would be forthcoming. We met and began developing a teaching manual for "Partnership in Astronomy." It introduced the subject matter to teachers in such a way that even teachers with little or no experience in astronomy in early school grades could develop a lesson plan. The heart of the manual had a series of projects and hands-on experiments that were developed by the participants in this project. There were a number of suggestions by various volunteers, including Michael Mattei, myself, Janet, and other volunteer amateurs. As an example, there were instructions on

how to make a "star bow" out of a yardstick, wood, and string. With this, children were instructed on how to measure the arc angles between various stars in the sky quite accurately. They also used this to measure the motion of planets and the moon against the background stars. An observing project on following the phases of the moon carefully was taken. There was a project to determine and discover retrograde motion of the planets, and determine the cause of this motion.

Another project took them directly into variable star observing. They were given maps of the sky centered on Cepheus, and shown how to find and estimate the brightness of the bright variable δ Cephei. They were to follow the star for some time, and then reduce the data, graph the data, and determine the star's period. The teachers loved this type of hands-on experiment, because it taught the children various valuable lessons. First, science can be a fun, hands-on experience, not the simple memorization of facts and figures. Discoveries can be made by careful observation. The sky is not static, and discoveries are made by observing and recording data. Mathematics is integral to true science, and useful to decipher the data collected, thus math and graphing skills have a place and should be learned well. Finally, writing and presenting data is important to convey the discoveries made. In short, the program encompassed many facets of a child's education, and encouraged them to integrate and excel. No wonder the teachers enthusiastically embraced the project.

The AAVSO then developed a cadre of volunteers that would work with the teachers in a selected town. At first there were three towns selected to develop the model, and smooth out any problems. The next year this was expanded to others and was warmly received by various school districts. There were provisions for improvisation built in. In the late 1990's with Janet's encouragement, I decided to have 5th graders build telescopes. Janet submitted a special NASA grant, and it was quickly approved! We obtained nine 6-inch mirror-making kits, and the school selected 18 children they felt were advanced and could complete a project of this magnitude. The children committed to staying after school every Friday afternoon for one year to grind their own telescope mirror and make a completed telescope. At the time I had Friday afternoons off, but also enlisted the help of another amateur, Robert Collara, who assisted in this endeavor. We taught the children how to grind and polish, and to the amazement of some parents who came to observe, all of the mirrors were successfully ground to a fine conclusion. They all had f-ratios of f/4 to f/6, and all made 1/4 wave or better (one came in at f/4 1/8th wave!!, a very fine instrument). Bob Collara and I precut plywood to have the children assemble Dobsonian bases, and cement forms for tubes. The children all decorated and finished the telescopes quite nicely, making wonderful wide-field and very usable telescopes for observing. Several of the telescopes were donated to the school and are still being used to this day for observations by later classes.

I had a most interesting conversation with one of the children in later years at a chance meeting at my son's high school football game. One of the seniors who was a participant in the mirror-making class years before came up to me and wanted to

inform me that, thanks to that experience, she had just been accepted to Rensselaer Polytechnic Institute in New York State, and is planning on a career as an optical engineer. I immediately felt quite humbled, and was struck by the impact of what I felt at the time was a casual conversation about science education in my living room with Janet Mattei a decade before. In this regard, Janet's legacy of promoting astronomy and science lives on through the people she has touched and inspired, myself included.

Hands-on Astrophysics was a later expansion of this program to high school curricula, and both have combined to spread the love of science and knowledge in school children nationwide. The success of the program lies in the careful manual developed for teachers, the close collaboration of amateur astronomers (and some professionals have joined as well) with their local school systems, but the heart of these programs remains the legacy of a very special motivating guide by the name of Dr. Janet Mattei, our former director.