

maintenance, care, and instruction in their use. The Center, with its facilities and expertise of its faculty members, will address those special needs. An example of this new and promising technology is an interactive laser-video-disc-system that is being developed in particular subjects.

The Center will provide a science/math lab for student microteaching. This will allow for the videotaping of a teacher's performance for evaluation at a later date.

The Center has worked very closely with hundreds of Michigan school districts and other universities in an effort to improve the quality of science and mathematics teaching. Along with arranging for mini-courses, workshops, and seminars for teachers, the Center also will assist in the evaluation of a school district's curricula and make recommendations for improvement. This effort includes extensive and cooperative grant development with school districts for the improvement of science/math education. Recently, a major grant helped train master teachers of science and mathematics at the middle school level who then returned to their school districts to conduct professional development activities for their fellow teachers.

THE WEEK-END ASTRONOMY CLASS FOR TEACHERS

James H. Hensley

Physics Department, University of Wisconsin-Platteville, One University Plaza, Platteville, Wisconsin 53818-3099, U.S.A.

1. Introduction

Astronomy is an integral part of many high-school science programs. Project STAR and the Science Assessment and Research Project at the University of Minnesota have recently recognized this. In addition, astronomy is a part of most elementary and middle-school science programs. In the Platteville, Wisconsin, school system, the solar system is a unit of study for all third grade students and a study of the stars is a part of the eighth grade science program. This is also true for other school systems in this area, in the Chicago area, and I would suspect, across the nation.

However, most elementary school teachers have had little science course work and none in astronomy. Middle-school and high-school teachers have better backgrounds for teaching science but little or no astronomy course work. Some of those who teach astronomy are active in local astronomy groups and read *Astronomy* or *Sky and Telescope* magazines, but this is the exception rather than the rule.

2. The One-Credit Solution

Teachers return to the university to take courses for a variety of reasons. Some take additional courses to advance on the salary schedule, some to meet accreditation requirements, and others to make up deficiencies. Since the fall of 1981, one-credit, Saturday courses in astronomy have been offered through the Office of Conferences and Workshops at Governors State University, located in University Park, a suburb of Chicago on the far south side.

The courses meet on two consecutive Saturdays, from 9:00 a.m. to 5:00 p.m., with an hour break at noon for lunch. The students are in class for fourteen hours and receive one credit hour upon successful completion of the course. The Saturday format allows teachers to complete the course as conveniently as possible. The courses have attracted teachers at grades K through 12, students completing degrees at Governors State University, and others interested in learning about astronomy.

No general source of outside funding is available for the teachers to attend. Many school districts will provide reimbursement for tuition and fees for teachers to take additional course work in approved areas of study. Some of the teachers were given support by their local school district.

Governors State University has supported the weekend astronomy courses by providing the teaching staff.

The first course in the series is *Astronomy in the Classroom*, a course designed to give the participants some updated knowledge in selected areas, such as results from the Voyager Spacecraft, the Supernova 1987A, and the Giotto Flyby of Comet Halley; hands-on experience with selected astronomy activities, such as the pocket sun clock, phase of the moon with small spheres, and elliptical orbits; and sources for astronomy resource materials: the Astronomical Society of the Pacific, Hansen Planetarium, and NASA.

It became apparent after *Astronomy in the Classroom* was completed in the fall of 1981 that a need existed for additional astronomy courses. Subsequently the following courses were developed: *Terrestrial Planets; Jovian Planets; Comet Halley; Stars and Nebulas; Galaxies and Quasars; Survey of the Night Sky; Introduction to Archaeoastronomy; Telescopes and Observatories; Intelligent Life in the Universe.*

An extensive set of class notes was developed for each course. The notes are reproduced and given to each student. These notes give the student a structure to follow as the day progresses. Breaks are taken every 50 to 60 minutes, depending on the material and activities of the course. Whenever possible, activities illustrating the subject matter are included. As an example, an incandescent filament controlled by a rheostat is viewed through a diffraction grating to illustrate a continuous spectrum and Wien's Displacement Law. Students draw several ellipses with string, thumb tacks, pencil, cardboard, and paper, and then determine the index of flatness for each ellipse.

3. Conclusions

The one-credit, two-Saturday, format for astronomy courses for teachers has

worked well in the south suburban Chicago area. The course offerings are rotated so that each course is repeated once every two years. The class notes are revised each time a course is offered. New activities are integrated into the material whenever possible.

The student response to the courses has been excellent. Most students who complete one course come back for additional courses, and many have completed the entire sequence. The enrollments have ranged from twenty to sixty. The courses will be offered again during the 1988–89 school year on selected Saturdays.

Daily schedules for each class may be obtained by writing to the author.

THE TRAINING OF PRE-COLLEGE TEACHERS THROUGH WORKSHOPS IN ASTRONOMY

Mary Kay Hemenway

Astronomy Department, University of Texas, Austin, Texas 78712, U.S.A.

Most pre-college teachers in the United States have not been trained in astronomy. In Texas, astronomical concepts enter the pre-college science curriculum at all levels.

During the last six years, I have presented two different types of workshops: intensive three-week summer institutes for rather small numbers of teachers, and shorter 6- to 18-hour workshops for larger groups.

The University of Texas Astronomy Department and McDonald Observatory have hosted five of the intensive institutes. The institutes were established to offer an opportunity to learn astronomy through hands-on activities (Texas education regulations mandate that 40 per cent of all pre-college science classes should be laboratory oriented), and to introduce the teachers to modern astronomical research and facilities.

The teachers bring a variety of scientific experiences to the institute. Unlike most teachers in Texas, 52 per cent of them have had an astronomy course. Since most pay all their own expenses, they demonstrate a high interest in astronomy. In five years, a total of 44 teachers have attended a three-week institute with six teachers attending more than once. Their background preparation showed that only 12 per cent had had an astronomy laboratory course, while 30 per cent had attended astronomy workshops. Astronomy as a separate subject was taught by 18 per cent.

The institute is an intensive experience with about 100 contact hours spread over the three weeks. Although the participants attend some lectures on current research by other faculty or research staff, the main focus of the institute is to provide them with hands-on activities and experiences that they can use in the classroom. The activities performed by the participants are taken from *Modern*