WHAT *IS* THE STATUS AND MAKEUP OF THE MODERN AMERICAN HIGH SCHOOL COURSE IN ASTRONOMY?

Astronomy courses, at least in the United States, do not hold a prominent place in the current American system. Over a century ago, astronomy was often required, as it is still in many other countries, especially those in Europe (Trumper, 2006). When the course was required, it was something all educated persons should know. Since it became a mere, though of popular interest, elective, appreciation of the Universe is and was the main reason of the course, with a high amount of 'mental improvement' thrown in. It was also taught almost exclusively by male teachers using few if any textbooks or materials as there were too few realia and curriculum packages for astronomy to generate teaching supplies.

Now, most courses are created by the teacher who has interest in the subject, and by some administrators for the practical reason of having an easier (by perception) elective or a second or more advanced science elective.

The course today is primarily an all-inclusive look at the whole universe, and most often taught in just half a year. Standards for astronomy courses are haphazard, often cobbled together from other courses and standards rather than existing as a structure on its own. It is only required by the tiniest of fractions of the schools, and only about one in seven offer a second course.

Of our estimated 3200 regular class teachers, the course is taught more often by a male teacher but only by a 2:1 ratio, a great improvement in the gender gap since Sadler's survey time. The teacher, though, has less training in astronomy than probably any other science courses' teachers. This is primarily an influence of the lack of state teaching certificates in astronomy and

college level astronomy education programs. Most teachers, while possessing majors in science, come from the biosciences and geosciences, not astronomy. Few astronomy majors in colleges turn to the high schools for employment. Astronomy teachers are better educated than most—nearly 8 in 10 have masters degrees in something (rarely astronomy), but have taken only 1-2 courses in astronomy at either the undergraduate or masters levels, if they took one at all. A large minority did not. If 'highly qualified' is defined as appropriate training in astronomy, most astronomy teachers are not; if the definition is broadened to be just a science degree (any science) and certification, then many teachers are highly qualified but there is a large out-of-field group teaching astronomy.

Ongoing content and pedagogical professional development after getting the job is often as little as ever. "Keeping up" comes primarily from certain websites and workshops, notably NASA's, astronomy magazines and books, and some association conferences. Teachers are notoriously isolated from training and each other; most astronomy or astronomy education organizations aren't reaching the high school teachers.

The teacher in this classroom is most often the only teacher of astronomy in the school, and he or she teaches just one or at most two sections 80% of the time. Like the solitary telescope operator, he or she teaches in isolation. Only perhaps one in seven gets to teach it full time. Most are teaching a physics course or geoscience course to make their paychecks.

The students are generally representative of their schools in gender and race and ethnic groups, though Asians and Hispanics are a little less than the national percentages. There is a small gender gap, a few percent difference between the national numbers and the school population. The students are most often taking astronomy as a capstone course; it is rare to be an introduction to science course at the freshman/sophomore levels.

The courses are found in larger than average schools, two times or more than the average sized high school (though some small schools do teach it) and in similar proportions between private and public high schools. Indeed, around 12% of all high schools have the course, but it is more often just one section, by one teacher. The schools tend to be more urban or suburban than rural, despite the clearer night skies of the latter…and though it was found that there is a hidden group of classes—single digit classes—that may be more often in rural schools than urban ones.

The use of textbooks is up dramatically in the past 2 decades but the complaints on their suitability have not lessened. The texts are generally written at college level. Materials for the curriculum, though, now come often from the World Wide Web; certain packages from the ASP and elsewhere can be found in some number. Planetarium numbers may have dropped over the decades since the heyday of the Space Age but at least 10% of all high school astronomy courses have immediate access to a fixed dome and 3-4% more may own portable planetariums. A growing amount of at least that last same percentage have adopted the use of 'planetarium software' for use in classrooms and on computers. Telescopes are less a concern, most schools have an average of three portables they can use and some have used their Internet access to not only use websites but also use remotely operated visual and radio telescopes.

High school astronomy classes may number as many as 4000 nationwide, but schools with regular sized classes number about 2500, 12-13% of all schools but only teaching to just over 3% of the students (80,000 ± ~3000), a growth of only ~10,000 since the early 1980s. (Compare that to 35% of all students taking physics, 60% chemistry and more than 90% biology.) But class sizes have held steady since that time or peaked a bit hgher and may have started to decline in recent years because of course cancellations and other outside influences, such as No Child Left Behind. Schools with astronomy are found in a higher proportion of

schools with an Adequate Yearly Progress status of Pass than the general population. This may indicate that schools with astronomy do better because of it, or those with astronomy that Fail have the course knocked off the schedule. Affluence or other factors may also affect this situation.

The future is uncertain. Astronomy has not been as deeply effected directly by high stakes testing and NCLB as math and language arts because until now science has not been included in the AYP analyses. That is supposed to be changing. Indirectly, astronomy courses have faced dropping enrollments and course cancellations because the NCLB-directly effected courses in math and language draw away the students and teachers into remedial operations. The pressure to put students into the traditional science courses in higher numbers is also draining away the students and teachers, and causing disappearing courses. If science becomes a major AYP factor, then the remediation efforts seen in language arts and math with the subsequent elimination of other non-core courses will almost certainly drive astronomy to near-extinction.

The teachers themselves are generally optimistic about the future of astronomy in their schools, but only barely so for the nation as a whole. Astronomy teachers have seen their courses and themselves become lower in value and status, and in practical matters of enrollments and funding. Astronomy holds on only when there is a teacher with knowledge and enthusiasm, support from their departments, administrations, students and the community, and how well the other courses are doing in the school. It helps if the teacher can incorporate and show both standards and astronomy helps AYP status levels with its integrated nature.

On the other hand, there is also pressure to add more years of science to the students' curriculum and that means astronomy teachers and courses may become an increasingly demanded commodity. If more schools require it or offer it, it may return to higher status,

numbers and prominence. And more teachers will be needed and they will need training and certifications that do not exist. More unqualified or out of field teachers will find employment.