

From: "Dr. Larry Krumenaker" <larryk@toteachthestars.net>
Subject: **High School astronomy survey article for you**
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Hello, forgive the intrusion. Three years ago I asked to broadcast an invitation to participate in a survey of high school astronomy on the your state science association listserv/ mailing list or in your newsletter. The dissertation is now long done and, as part of the way to complete the process, I've also managed to get some articles published in various scholarly journals based on the study. The last of those should go online this week or early next week at the latest. The other part is to give back to the rest of the Community, to reach persons who may have seen the invitation but wouldn't see the articles.

I am inquiring if you might be able to broadcast a small article, if you like, on the findings and the tangible results coming from the study, which is below. It can go out via your listserv, into a newsletter, or any other means you choose. If you are no longer involved with the listserv or newsletter, can you forward this on to whomever does it now?

Thank you. Hope all is going well with you in these hard economic times

Sincerely,

Dr. Larry Krumenaker
Atlanta

Exactly three years ago, an invitation from me for members of this discussion group was broadcast, asking persons to participate in a survey of high school astronomy courses. Around 400 teachers, quite a few persons from this group, responded and took that survey which was the first large scale survey of the field since the 1980s. The survey looked at:

- who was teaching high school astronomy—the teacher's background and training and courses they teach and took, and how many are in the school teaching the class;
- who takes astronomy—the demographics of the students in these courses, the average class size and grade levels involved;
- the courses themselves—what is covered, their purpose, prerequisites,
- what curriculum materials are used, from textbooks to planetariums, from telescopes to budget;
- how the teachers would advise persons who wanted to create an astronomy course in a high school, including how to keep up—which magazines and

- websites they use, which conferences are helpful;
- what effects has No Child Left Behind (NCLB) had on the astronomy course;
 - and questions about the teachers' views of the future of astronomy courses and why such courses should be taken.

I am the fellow who sent out that plea and from it came a doctoral dissertation for which I now want to give back a little to the educational community.

I actually did three surveys, two to high school astronomy teachers--the original email version and a second one sent out by postal means that also looked at classroom teaching style and the college plans of the students--and one to principals in schools without astronomy. The first one became the bulk of the dissertation. The abstract read:

A spring 2007 nationwide survey of high school astronomy teachers investigated: how many high schools teach astronomy, teacher backgrounds, student demographics, classroom materials and facilities and other facets of the modern course. Comparisons were made to Philip Sadler's 1986 survey and to various states' Departments of Education data. This multimethods study included qualitative questions investigating teachers' perceptions about effects from 2001's No Child Left Behind Act (NCLB) on their classes, views of course futures in their schools, and the nation. Other questions solicited their community wisdom on starting a course, defending it, and what needs to be done to increase their number.

Significant conclusions include: the number of regular classes are about 3200, totaling up to 4000 when a 'hidden' single-digit-sized classes population is added in; fully 20% of all classes may be with 10 or fewer students. A course is found in 2500 schools, 12-13% of all U.S. high schools.

Many of Sadler's numbers are unchanged in 22 years. However, the ratio of male to female teachers has gone from 88:12 to 67:33. Many teachers now come from the bioscience and geoscience majors, not physics. We tally 3-4% more schools now than Sadler, and nearly twice the teachers (3200).

Schools with astronomy are more often Passing in Adequate Yearly Progress (AYP) than the national norm. Classes generally reflect racial, gender and ethnic demographics of their schools and the nation.

More than half of all teachers claim no direct effects from NCLB on their courses, most of the rest seeing negative effects, generally dependent on how other science, math and language courses fare.

A growing number supplant conventional planetariums with computer

"planetarium" software, currently at the same rate as portables ownership.

Twenty-eight percent of teachers are not 'highly qualified' in that they have never had an astronomy course, let alone an astronomy degree.

Teachers are generally more optimistic than pessimistic but their optimism is mostly for their school, not for the fate of courses around the nation.

A six-part plan for starting a class is developed and six defensive arguments are also offered.

Some additional notes: there has been one direct effect of NCLB—teachers, including some decades-long veterans of teaching astronomy, have lost their positions because they were no longer "highly qualified," which is difficult to be because not one state offers teacher certification in astronomy. Some of my surveyed teachers in planetariums had their facilities closed as for reasons of not being pertinent to a schools Adequate Yearly Progress score.

Another is that even that estimate of how many schools use computer software, like Starry Night, in place of planetariums may even be higher than the 3-4% of all schools noted in the dissertation, perhaps as much as 10-15%, a result of the second mentioned survey.

Some of those things needed to improve the situation for high school astronomy include:

- Putting more astronomy into state standards, and into standardized testing;
- Show that astronomy needs to be in schools because of its multidimensional and interdisciplinary nature as well as life-long and hands-on experiences
- More teachers are needed—not only the willing and enthusiastic ones but more who are trained in astronomy and in how to teach it. More training is the highest priority.
- Perceptions of the value of astronomy among all levels of administrators—from school principals to state and Federal departments of education—must be raised.

For those who want all the gory details, these can be found in several articles that have appeared in the scholarly journals *Astronomy Education Review (AER)* (two on the first two surveys), *The Planetarian* (specifically on the subset of high school teachers of astronomy with planetariums), and in *The Science Educator* (on the effects of No Child Left Behind on astronomy courses). A last article, on the principals

survey will be online at *AER* within a few days and I think it is the most important because it contains a prescription for increasing the amount of astronomy in high schools. Some of these articles are freely available online, some online on two subscribers and one not online at all; two are available in print. I have placed my copies of all these articles online at <http://www.hermograph.com/highschool/highschoolastronomy.htm> .

In order to have more practical effect than just a personal trophy, I am trying to put some of the findings into practical use for astronomy teachers. One of the dissertation findings was a desire expressed by teachers for a purely astronomical, practice-oriented publication. The rare astronomy education "how to do it" articles are scattered in various publications for other venues, such as *The Physics Teacher* or an education magazine. To provide one focus for all teachers (whether using planetariums, software, or just blackboards on a wall) I have created *The Classroom Astronomer*, a quarterly magazine for teachers of astronomy, which is shortly going to put out its third quarterly issue. You can look at the magazine and even download the first issue for free at <http://classroomastronomer.toteachthestars.net> . Contributions are welcome.

Later this year, all that material about how to create, run, and defend a course from high stakes testing and NCLB will come out in a book by Hermograph Press. For those who may wish to know when the book is available, I ask that you email me so I can send you that information.

I gratefully thank all those who answered my call in 2007 and wish all readers of this note success in their astronomical and/or educational endeavors. If I can supply more information or be of assistance in astronomy education, please do not hesitate to contact me.

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