

ANNIE AND THE STARS OF MANY COLORS: VIDEO PORTRAIT OF ASTRONOMER ANNIE JUMP CANNON

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Abstract

This paper describes the content and production of a new video documentary in which fifth-grade students explore the childhood and career of Annie Jump Cannon through hands-on activities at the Harvard University Archives and the Harvard-Smithsonian Center for Astrophysics.

1. Introduction

Many bright students, notably girls and minorities, do not elect physical science courses in high school and college. They drift away from science as early as grade school (Betz 1990; Shepardson and Pizzini 1992). The aim of our project was to create for fifth-grade teachers a video that would help them inspire and motivate their students to brave the challenge of physics and chemistry courses in high school and college (Kloosterman and Gorman 1990; Hayden and Gray 1990).

For the subject of our video we wanted a historic woman astronomer. We thought that fifth-graders would relate well to the astronomical concepts and technology of the nineteenth century (Fleming 1993). Also, we decided that girls needed professional woman astronomers as role models. In selecting a pioneer woman astronomer, we found that Annie Jump Cannon (1863-1941) had both the scientific qualifications and personal qualities that we wanted to present to children (Gibbons 1992; Garcia *et al.* 1990).

2. Subject

Annie Jump Cannon was committed to her career in astronomy and continued to work on stars through the last days of her life. For her accomplishments she received many honors and awards. Oxford University gave her an honorary D.Sc. in 1925 and the National Academy of Sciences presented her with the Draper Gold Medal in 1931. In each case she was the first woman to be so recognized. Also, she popularized astronomy by presenting radio talks and giving illustrated lectures to many astronomical and women's clubs.

Cannon's personal characteristics are no less remarkable than her professional ones. In her lifetime she was cherished by many people. Long after she graduated from Wellesley College she kept up with classmates and was one of the most popular and most distinguished members of the class of 1884. At astronomical meetings she was sought out as much for interesting conversation as for her expertise on stellar spectra. Anyone who ever heard her talk about the stars was instantly captivated by her charm and wit. In her day, Cannon was not only the most distinguished woman astronomer in the world, but also one of the most beloved.

3. Research

Having chosen Cannon as our subject, we began to talk about our project with several science teachers in local elementary schools. We wanted to learn how and when they used videos in their classrooms. We discovered that almost all the teachers we interviewed were using videos in their classrooms. Many used either short videos (less than ten minutes long) or short sequences from longer ones to show experiments or explain concepts. Some teachers used videos to replace parts of prescribed topics in their course plans. Others used them to enrich subjects that were of special interest or somewhat difficult for their students to comprehend. And all were concerned that a substantial number of their capable students, namely girls and minorities, would become science drop-outs before they entered college.

We also wanted to talk directly to fifth-graders about our project, so we arranged to visit classes and present a slide show about Cannon, her childhood, and career. The children responded very positively. The boys tended to sit at the back of the room. The questions they asked were primarily about stars: How far/near, young/old, bright/dim are they? Many of the girls came forward and eagerly clustered around us. They, too, wanted to know about stars. But they also asked questions that reflected their personal concerns: Did Annie Jump Cannon have boyfriends? A husband? Children? For our project, the fifth-graders said they thought it would be more interesting to watch a video in which their peers participated rather than one in which adults presented the ideas. We decided to respond to their preference.

4. Method

Our method was to set up at the Center for Astrophysics and the Harvard University Archives a summer workshop in which a multicultural group of fifth-graders from local schools participated. Staff from both institutions volunteered their time to lead activities. We documented the students on videotape as they learned about how Annie Jump Cannon grew up in Delaware, studied physics at Wellesley College, and examined spectra at Harvard College Observatory. To teach the students about spectra, Fiona Hughes McDonnell set up several experiments on light and color. The students then assembled spectrometers from kits and observed the spectrum of fluorescent lights and the setting Sun. We encouraged them to sketch their observations in journals. They used crayons for the continuum and sketched in as many dark absorption lines as they could see. At the Harvard Science Center, Professor Robert Noyes unveiled a large solar spectrometer and students easily saw how astronomers could spend a lifetime studying thousands of lines in the spectra of the Sun and stars.

Dr. Martha Hazen met the students and told them how a biography of Cannon had influenced her to study astronomy in high school. She also related that she now held the title that Cannon once had at Harvard College Observatory - "The Curator of Astronomical Photographs." Then she introduced the students to stellar spectra on some of the very photographs that Cannon had numbered and used for the Henry Draper Catalogue. She also gave them a tour of the plate stacks and showed them some historic record books. At the Harvard University Archives, Michael Raines and Robin McElheny introduced the group to some of Cannon's personal photographs and scrapbooks. The students appreciated the opportunity to hold historic items and open old photograph albums. What they seemed to enjoy most were Cannon's report cards from Dover Public School and her diploma from the Wilmington Conference Academy.

To show the students how Cannon's spectral classification is used today, Drs.

Sallie Baliunas and Robert Donahue brought up a computerized version of the Henry Draper Catalogue on their monitor. They showed the students how they searched for stars with solar-type spectra and how they studied "starspots." They also showed them computerized plots of absorption lines in stellar spectra.

5. Evaluation

In three days, we shot almost twelve hours of documentary footage which we had to edit and merge with still footage of historical pictures. By October 1992 we had edited about one-third of the student footage into two sequences which we presented at the 1992 AAVSO Annual Meeting. The feedback from members helped us to finish our editing. By December we had completed a preliminary half-hour version of the video to present to classrooms of fifth-graders and their teachers. From their comments we decided to expand some sections and cut others entirely. Finally, in February 1993 we held our world premier screening in Phillips Auditorium at the Center for Astrophysics.

6. Acknowledgements

We invited Margaret Walton Mayall to be our distinguished guest of honor at the premier. She had been Cannon's protégée from 1924 to 1941 and subsequently became the curator of all the historical Cannon material. For her help and inspiration on this project, we decided to dedicate the video to her.

Funding for the project came from Smithsonian Institution; we received grants from both The Women's Committee and The Office of Educational Outreach. The Public Affairs Office at the Smithsonian Astrophysical Observatory has played a key role in the whole process: Caroline Lupfer served as associate producer and James Cornell is currently helping us market and distribute the video. The video was produced on site at the Science Media Group, Matthew H. Schneps, Director. Numerous other staff members at the Center for Astrophysics supported the project with their expertise.

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Figure 1. Annie Jump Cannon (1863-1941). Photo courtesy of Harvard College Observatory.