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INQUIRY LEARNING IN COLLEGE CLASSROOMS

For the times, they are, a changing

PREAMBLE

Readers of a certain age will remember the subtitle of this chapter as the title and beginning phrase of a memorable Bob Dylan song, which was popular in the 1960s (Dylan 1985). This was a decade of major changes. The opening decade of the 21st century is also a decade of major changes in American colleges. Everyone is starting to pay attention to teaching. These changes are nicely illustrated by a little story.

In June of 2000 I hosted a major astronomical conference, the 12th European Workshop on White Dwarf Stars. These conferences are like medieval pilgrimages, events where people from around the world assemble to share their latest findings. Most of the conversation at conferences like these has to do with the astronomical quarter-acre of ground which the participants all share an interest in. For this conference, the topic was white dwarf stars: tiny balls of enormously compacted starstuff, no larger than the earth, which are the final stages in the life cycle of stars like our sun. The printed record of the conference is now published (Provencal, Shipman, MacDonald, and Goodchild 2000).

When the conferees took a trip to a nearby garden in Pennsylvania, I contrived to sit on the bus in a seat next to my old friend Jim Liebert, a senior astronomer whom I have known for over 25 years. Jim is a full professor at the University of Arizona, one of the top departments in the U.S., and shares many other characteristics of a Apundit,@ a leader in the profession. For example, he has played a major role in supervising the management of The Astrophysical Journal, the premier astronomy journal in America. I wanted to talk to Jim about using a forthcoming spacecraft to seek planets and low-mass objects around white dwarf stars. I wanted to have my astronomer’s hat on. That’s not what happened, and I was pleased that the conversation turned elsewhere.

As we wandered around Longwood Gardens, it turned out that Jim wanted to talk to me about something else: inquiry based teaching. Jim has always been a good teacher, and his teaching, like the teaching of most American professors, has generally been in the lecture mode. I had done a few things at the conference which
were designed to suggest that teaching and lecturing were not necessarily the same thing. I was pleasantly surprised that he really wanted to bend my ear for the better part of an hour about teaching, and in particular how to get students to work in collaborative groups in a large class. We did talk about the technical astronomy stuff, but for only a few minutes.

In the 1970s, such a conversation at a research meeting would have been inconceivable. There were no organized sessions on education at astronomy meetings, and while there was an “education” category for papers, I can’t remember anyone ever using it. But in the 1990s and 2000s, these conversations are common. Special sessions on education at meetings of the American Astronomical Society and the American Chemical Society are regular events. I have had dozens of conversations similar to the one which I described above. For example, I went to Columbia University to give a technical talk on astronomy and was pleasantly surprised to spend most of dinnertime talking about the University of Delaware’s teaching center, which I was then directing. I remember a lunchtime conversation next to the beach in Blanes in Spain’s Costa Brava, talking to Maria Teresa Ruiz of the Universidad de Chile, not about the very cool white dwarf stars which she was an expert on, but about teaching. University professors are really starting to think seriously about teaching, and are taking inquiry learning seriously. The times, they are indeed, a changing.

INTRODUCTION: FROM LECTURES TO INQUIRY

Most college classes are usually thought of as lectures. The notion of a college professor as a “sage on the stage” is at least a century and a half old (Boyer 1987, p. 149) and perhaps older. In the nineteenth century at some of America’s older universities like Harvard and William and Mary, someone probably stood at the front of a room, in an academic gown, talking for some extended period of time. I wonder if, before the printing press existed, the same script was played out in the old European universities like Bologna, Paris, and Oxford in the middle ages.

Until recently, the same drama was played out in almost every classroom in almost every American university, with a few changes. The academic gown is no longer a professors’ standard workday clothing. Centuries ago, professors were always males of European ancestry; by 1985, the professoriate had become a little bit more diverse, though not diverse enough. My principal observation is that for centuries the college professor always stood in the same place: immobile, at the front of the class, and sometimes on an actual stage. I taught my first college class on a stage in the fall of 1971. And I lectured, just like my teachers had always done. I did allow for a few short interruptions for questions from a few courageous students.

In the past fifteen years, a number of university faculty have begun to recognize some of the serious limitations of the lecture style of teaching. We have begun to experiment with some learning techniques which have been used in at least some K-12 classrooms, and in some other disciplines like business, for a longer period of time. In many classrooms, students spend a good deal of time sitting in groups,