The Texas Connection: Transferring professional development workshops for astronomy teachers and student field experiences to distance learning technologies

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Abstract

Texas is a big state! It measures 1244 km from east to west and 1289 km from north to south. It is as large as all of New England, New York, Pennsylvania, Ohio and Indiana combined and slightly larger than France. As the state’s only professional observatory, our goal is to reach as many K-12 teachers and students as possible in Texas with astronomy activities that align with the state’s teaching standards, Texas Essential Knowledge and Skills (TEKS).

The Frank N. Bash Visitors Center at McDonald Observatory near Fort Davis is the hub for our teacher workshops and student field experiences. It is also located on a remote mountaintop, which makes arranging student field trips difficult, so we have chosen to use videoconferencing technology, which the Texas Education Telecommunications Network (TETN) supports for most K-12 teachers and students around the state, to reach our target audience.

A science consultant and four teachers met with us at the Observatory to determine how best to transfer components of our student field experiences to this technology. We have pilot-tested our first professional development workshop for teachers via videoconference with Region XI teachers. As our distance learning programmes gain momentum, we are branching out to work with the other Education Service Centers around the state.

Four teachers and a science consultant (Becky Yarbrough) came to McDonald Observatory over a weekend in January 2005 to help design the videoconference version of the student field experience. While at the observatory, the teachers participated in on-site student field experiences and then recommended components and content to adapt to videoconferences. NASA IDEAS funding allowed us to create a solar viewing programme that aligned with Texas Essential Knowledge and Skills and Texas Assessment of Knowledge and Skills. Components of the solar viewing programme make up an important part of the videoconference. The programmes were then tested in the classrooms of the Fort Worth teachers that helped design the videoconference. Each teacher was responsible for recruiting two other classrooms to test the videoconference. Following the evaluation of the test programmes, the videoconference material was modified.

The content for the student field experience videoconference includes an interactive connection with Marc Wetzel, the Observatory’s presenter. Marc takes students on a virtual tour of the 82-inch telescope, they participate in solar viewing and he answers questions during a 15-minute Q&A period. Teachers are asked to submit students’ questions in advance of the programme. In Sep-
In September 2007 we launched the “Live from McDonald Observatory” videoconference programme officially. A school can sign up on the Connect2Texas website. The programme is available for $100 for a two-way connection with a lower fee charged for view-only access. Teachers can access introductory information, a pre-assessment test, pre-conference activities, post-conference suggestions and activities and a list of related resources online.

In February 2007 we pilot-tested a professional development workshop. Dr. Mary Kay Hemenway and Marc Wetzel developed a menu of activities from those activities normally offered in on-site teacher workshops and these were presented during three two-hour periods by videoconference. Becky Yarbrough was available to help co-facilitate the activities with the teachers. Evaluation was conducted using pre- and post-tests and focus groups. Post-test scores were almost 20% higher than the pre-test scores.

In 2007-08 funding from American Electric Power will support videoconferences in each of the areas where they supply power. We will also offer an on-site teacher workshop for teachers in Fort Davis, Marfa, and Alpine. Facilitators from four of the six regions have been trained and will be co-facilitating where the teachers are located.

Unexpected outcomes and lessons learned

One of the unexpected outcomes of videoconferencing is the opportunity to offer many schools a view-only experience, thereby making it possible to reach hundreds of schools and thousands of students. In 2006, we presented an Astronomy Day programme to 7500 students in 160 schools and again in 2007 to 5840 5th-8th grade students in 121 schools. During the Astronomy Day, Marc Wetzel led students through a scale model activity on the Solar System, conducted live observations of the Sun and used computer software to demonstrate the positions and orbital planes of objects in the Solar System. At the end of the programme a McDonald Observatory astronomer joined Marc in the studio to answer students’ questions. 94% of the teachers who completed the evaluation agreed that the videoconference session illustrated astronomy in ways not possible in their classroom. Two-way interactive videoconferences do offer a better experience, but multipoint view-only videoconferences reach many more students.

To overcome the logistical difficulty of connecting to many sites simultaneously, connection tests are usually done before the programme takes place. Connect2Texas is responsible for the advertising, registration, testing and hook-ups for all of our videoconferences.

External technical problems included blurring digital images probably caused by overloaded bandwidth. In the classroom the camera malfunctions when teachers forget to mute their microphones, which causes the camera to switch to the classroom rather than staying focused on the presenter. Teachers often omit the recommended preliminary work before the conference. We try to keep the preliminary work to a minimum, but some work is required for the interaction to be effective.

1 www.connect2texas.net
2 www.mcdonaldobservatory.org/lfmo
In a teacher professional development workshop videoconference, the presenter cannot walk around the room to make sure participating teachers understand the activity. An on-the-spot facilitator who has been trained in the activity before the videoconference is necessary. Now that our student field experience videoconferences have been officially launched, we plan to create a menu of different programmes for different age levels and topics. We expect that classrooms that purchaser videoconference programmes will be repeat customers during the year and we want to be able to offer them varied content.
Figure 4 – The programme includes live views of the Sun from telescopes at McDonald’s Visitors Center, weather permitting.

Figure 5 – The 20 Regional Education Service Centers in Texas.

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