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Motivating Reluctant Learners with a Big Bang

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Abstract. We present results of a collaboration between a media specialist, a science teacher, and an astronomer to bring a modern astronomy topic to at-risk, emotionally disabled students who have experienced little success. These normally unengaged students became highly motivated because they were given an authentic task of presenting research on an intriguing science topic, and because they witnessed a collaboration brought together on their behalf. This experience demonstrates that sophisticated astronomy topics can be used to motivate at-risk students.

1. Reaching a New Audience

We reached out to a new audience of students through a collaboration between a media specialist, a science teacher, and an astronomer. This student audience consisted of at-risk, emotionally disabled students for whom expectations of success are low. The media specialist had worked with both average and honors students, but desired to extend her promotion of research using online databases and technology to students who are often left out of main-stream experiences. For the topic, the science teacher selected the Big Bang, which is part of the curriculum, because he thought it would be a high interest subject for his students, and it would lend itself well to student research. They joined with a NASA scientist who could successfully present the latest research to high school students. Together they developed and presented a set of integrated, multi-sensory activities using a project-based instruction approach.

In this collaboration, the media specialist (Cvetic) provided instruction for utilizing library resources for doing research and using computer technology for producing the final project. The science teacher (Hall) provided the science background as preparation for the visiting NASA scientist, as well as guidance and assessment of students' final project. The visiting NASA scientist (Lochner) provided input for the background presentation, and gave an expert content presentation to the students.

2. Our Reluctant Learners

This class consisted of nine students who are part of the Chesapeake Regional Program. These students are emotionally disabled, often coming from extremely trou-

bled homes and often in trouble with the law. They frequently exhibit behavioral problems, and are distrustful. School is not important compared to the trauma in their lives, and they feel the educational system has failed them. The Program has its own therapist, psychiatrist, social worker, and law enforcement officer. Each class has a teacher and at least one teacher assistant. It is a separate day school within a regular high school, providing a safe, therapeutic academic environment. Goals of the Program are to "prepare students for transition to general education or to the workplace." In reality, because of their extreme behavior disorders expectations for student success and achievement are low. Their classes are completely separate, and the students are often ostracized in the school.

3. The Big Bang Unit

We developed a 7 class-period unit consisting of a variety of lessons and activities, including a pretest on their familiarity with library resources and astronomy, a scavenger hunt on astronomy using library resources and online databases, content lessons, the visit by the NASA scientist, a lesson on techniques for avoiding plagiarism, and a lesson on communicating their research results. Under the guidance of the science teacher, students developed 5 essential questions of their own about the Big Bang, and researched answers using library resources and online databases. They also used appropriate citations for each question and developed a bibliography. They created a poster with their research results using Microsoft Publisher, which was printed, enlarged, and displayed outside their classroom. The unit ended with a field trip to NASA/GSFC, where the students toured the facility and participated in hands-on activities.

4. Student Accomplishments

These student rose to the challenge! The students were initially apathetic on the pretest, but became attentive and engaged during the science teacher's background lesson. The students then showed great interest during the presentation by the visiting NASA scientist and became highly motivated by this topic. The students were extraordinarily engaged in using the online databases to research their questions and in designing their posters. Their accomplishment was commended and recognized by school faculty and the administrator of the Chesapeake Program.

5. What Motivated These Reluctant Learners?

The students were motivated by the fact that they were presented a challenging, but interesting topic, with a specific, doable goal. In particular, they reacted positively to choosing their own questions, working with the online databases, and developing their posters using the computer. The students recognized that the visiting NASA scientist took them seriously and didn't treat them differently from other high school students. Most importantly, the students witnessed their science teacher joining with the media specialist and a NASA scientist, and that team working together on their behalf and interested their success. This experience demonstrates that sophisticated astronomy topics can be used in teaching and motivating at-risk students.