

SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Ignition - Primary Space Education (1)

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THE EFFECTS ON MATH ACHIEVEMENT AND ATTITUDES WHEN INCORPORATING
SATELLITE EDUCATION IN A 4TH GRADE CLASSROOM**Abstract**

During the 2012-2013 school year, a fourth grade classroom at Academia Cotopaxi's International American school in Quito, Ecuador, undertook the challenge of embedding satellite education into the regular curriculum for the purpose of enhancing mathematical achievement and attitudes with students. Satellite resources were attained through both the Ecuadorian Civilian Space Agency (EXA) and the National Aeronautics and Space Administration (NASA). Through EXA, students downloaded real-time satellite images in order to provide hands-on learning experiences, attained through the utilization of WX-ToImg software and in conjunction with National Oceanic and Atmospheric (NOAA) satellites, and which naturally lent themselves to authentic learning opportunities. The program was based on the HERMES Delta operation mode of the HERMES-A/MINOTAUR ground station, built by the Ecuadorian Space Agency (EXA), which acts as a link between the Internet and the Earth's orbit. This opportunity allowed for students to interact with satellite images in such a way that mathematics became immediately relevant and purposeful in their lives. Simultaneously, satellite education activities were integrated as part of NASA's Endeavor Science Teaching Certificate Fellowship Project and the Weather Data Learning Center (WDLC). The WDLC is an online resource that teaches 4th grade mathematics in the context of weather. Both satellite programs were grounded in applying US national math standards to real-life learning, and also aligned well to satisfying the science education standards established by the US National Research Council. In this paper we discuss the teaching methodology as well as actual classroom results from the utilization of the virtual HERMES ground station within the Academia Cotopaxi classroom, in conjunction with the WDLC lessons. Through genuine educational experiences, the students interacted with satellite software, computers and an interactive SMART board. Targeted mathematics activities carried out by the students included the use of manipulatives, weather observation, inquiry-based lessons, data collection and analysis for purposeful learning experiences. Additionally, both the US and Ecuadorian educational communities took notice of this innovative application for the elementary classroom - especially in light of the fact that Ecuador will launch its first satellite, PEGASUS, in 2013 - and this interest also resulted in the creation of EXA's international and collaborative pilot program titled ASTERIA. Presented material in the final paper includes several examples of student's work, as well as an overview of satellite lessons and research-based teaching strategies put in place with the purpose of increasing student learning and performance.