



Brownfield Action Online - An Interactive Undergraduate Science Course in Environmental Forensics

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Brownfield Action (BA) is a web-based, interactive, three dimensional digital space and learning simulation in which students form geotechnical consulting companies and work collectively to explore problems in environmental forensics. Created at Barnard College (BC) in conjunction with the Center for New Media Teaching and Learning at Columbia University, BA has a 12-year history at BC of use in one semester of a two-semester Introduction to Environmental Science course that is taken by more than 100 female undergraduate non-science majors to satisfy their science requirement. The pedagogical methods and design of the BA model are grounded in a substantial research literature focused on the design, use, and effectiveness of games and simulation in education. The successful use of the BA simulation at BC and 14 other institutions in the U.S. is described in Bower et al. (2011 and 2014). Soon to be taught online to non-traditional undergraduate students, BA has 15 modules that include a reconnaissance survey; scale; topographic, bedrock, and water table maps; oral and written reports from residents and the municipal government; porosity and permeability measurements of the regolith (sand) in the area of interest; hydrocarbon chemistry; direction and velocity of groundwater flow; and methods of geophysical exploration (soil gas, ground penetrating radar, magnetic metal detection, excavation, and drilling). Student performance is assessed by weekly exercises and a semester ending Environmental Site Assessment Phase I Report that summarizes the individual and collective discoveries about a contaminated subsurface plume that emanates from a leaking underground storage tank at a gasoline station upgrade from the water well that serves the surrounding community. Texts for the course are Jonathan Harr's *A Civil Action* and Rachel Carson's *Silent Spring*, which are accompanied by questions that direct the reading.