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| pn-logo-on-wte | **2013 ACE Critique and Awards Program** ***NMSU Media Productions — Jeanne Gleason*** |

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| ***Multidimensional Thinking*****Class 45:Electronic Media for Targeted Publics** |  |
| **To see the final video, please visit** [ace.nmsu.edu/2013/soil/Class453D.html](http://ace.nmsu.edu/2013/soil/Class453D.html) |

Overview:

The “Multidimensional Thinking” animation is part of a larger suite of learning tools developed to retain and attract underrepresented, undergraduate students in the soil and environmental sciences. This project was designed to assist students in understanding STEM concepts that frequently deter them from continuing in science-based majors. Using a successful design model established at NMSU, the team conducted focus groups with potential employers, and with teaching faculty, to identify those concepts that are difficult for students in the program, or pre-requisites that teaching faculty must spend valuable class time covering. From those focus groups, the team refined educational objectives and created educational animations and interactive tools to supplement instruction (with additional tools in progress and slated for completion by August, 2013). The products have been pilot tested in coursework, with both qualitative and quantitative testing planned. It is anticipated that all modules will be posted online for use nationally by December 2013, and promoted through journals and conference presentations after that.

Purpose (goals, objectives, need):

Underrepresented students at Hispanic Serving Institutions traditionally enter college with weaker math and science skills. This means they are often at a disadvantage from the first day of class, without a conceptual grounding in the prerequisite concepts embedded in the core science courses. ***Multidimensional Thinking*** began as a need for students to better understand unit conversions, specifically the way to annotate equations with the proper exponent (2 for items that should be squared and 3 for items should be cubed). However, through the instructional design process (which includes questions like, “why do learners get this wrong?” and “what concepts do they misunderstand, which cause learners to use the wrong notation?”) it became clear that the problem wasn’t simply in the *notation* of numbers, but in the concept of how measurement is affected by the dimension of what is measured. This realization yielded specific objectives for the learner, crucially visualization of differences in length, area and volume. Though these concepts cut across many different types of science learning, this project is designed for students in soil and environmental sciences, so team members wanted to speak directly to these students, with examples particularly relevant to them. Even more directly, the scriptwriters wanted learners to feel that they were in a special “club,” and that these issues were crucial to their field.

The script and the visuals are inherently tied: in fact, from the earliest review of the script, the team reviewed narrated storyboards, so that both the words and the visuals could evolve. The graphic style is also relevant to the script, setting a visual tone that reflected the humor and accessible vocabulary used in the script.

Audience:

This animation is designed to be used as part of class instruction, or as homework for class preparation, in undergraduate college courses with students in soil and environmental sciences. It was funded specifically to attract and retain underrepresented students in careers at USDA.

Marketing/promotion:

The animation was completed late in 2012, and will undergo testing in fall, 2013. It has already been shared at academic conferences, and will be part of a larger marketing push when the remaining modules of the series are completed. These include interactive modules on reading graphs, interpreting logarithmic scales, and exploring career activities in soil sciences. The online resource will be given a custom URL and will remain available for at least 5 years beyond close of the project. In addition to distribution through this online resource, the animation will be posted to *YouTube*, *TeacherTube* and *iTunesU.* It will be shared through other websites, such as the curriculum section of the Western Society of Weed Science and the *Plant and Soil Sciences* library housed at University of Nebraska. Because the website will be operational mid-project, team members are able to begin promoting its use before completion of the project at conferences such as the American Society of Plant Biologists and the Association for Communications Excellence in Agriculture, Natural Resources, Life and Human Sciences. In addition, summative articles regarding its effectiveness and availability will be submitted to *Journal of Natural Resources and Life Sciences Education* and the *Journal of Applied Communications.* Finally, resources will be promoted through professional discussion boards and web links from the Soil Science Society of America and iTunesU.

Role of each entrant for the project:

All work, including animation, scriptwriting and instructional design, was produced in NMSU’s Media Productions studios. The specific team is listed in the credits.

Extent to which project met goals and objectives:

Though summative evaluation of the impacts of the animation in class will be conducted in 2013, the animation has seen three rounds of formative testing with undergraduate students, including with earlier versions of the script and graphics. Response to the final version has been positive, with testers able to describe accurately, and in their own words, the impact of different types of measurement, and notation for each. Response to the module from faculty has been so great that the team is submitting a second grant to develop additional materials with the same tone and approach.

How diversity was incorporated into entry:

NMSU takes very seriously its responsibility as one of the nation’s only four-year, land-grant, Hispanic-Serving Institutions. For example, NMSU’s short mission statement revolves around its responsibility to serve *“the educational needs of New Mexico’s diverse population.”* This means agricultural programs must address the lack of pre-requisite knowledge in math and science many New Mexican students bring to their university experience. By testing with underrepresented students, and seeking to design characters that appeal to a variety of learners, the team considers diverse populations throughout development.