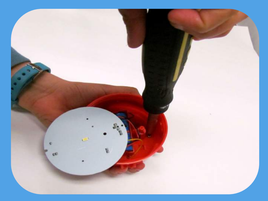
Apprenticeships in Sustainability Science & Engineering Design

Center for Sustainable Energy and Power Systems at UC Santa Cruz, Baskin School of Engineering, Monterey Bay National Marine Sanctuary Exploration Center; Santa Cruz Natural History Museum and Santa Cruz County Office of Alternative Education PI Issacson, Michael; Co-PI Ash, Doris; Co-PI Parker, Jennifer; Project Scientist Ball, Tamara

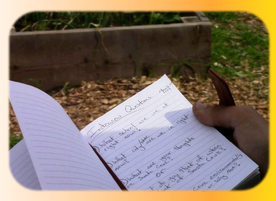
NSF Award no. DRL-1323804

Apprenticeship Learning x 2

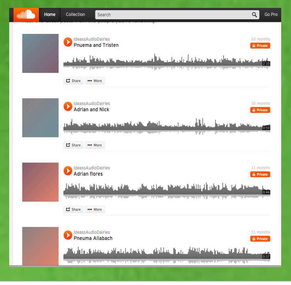
Design and build

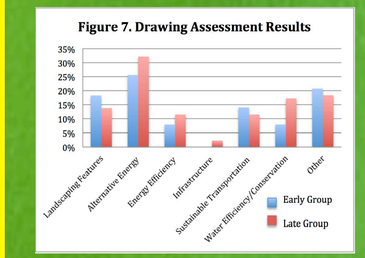


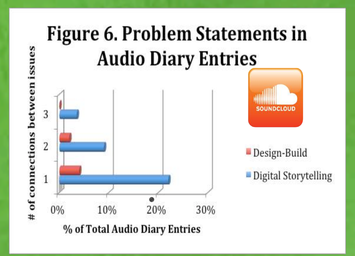
Digital Storytelling



Learning Assessment







Systems Thinking for Wicked Sustainability Problems: Analysis of early and late annotations added to line sketches of a residential building provided insight into apprentice's perspectives on sustainable systems and technologies. Refining this instrument could provide information on understanding tradeoffs and design constraints in wicked sustainability problems

Scientific Argumentation: Analysis of weekly audio-diary entries provided information on how apprentice's were formulating and articulating problem statements. Sophistication coded as number of connections among issues and recognition of tradeoffs among impacts. Iterations on repeated prompt proved efficacious, pilot coding scheme is now under revision.

Collaborative Learning Communities

Community College students

Community Service Organizations

Retired Professionals

Municipal Government yh

Visitors to Museums and Exploration Centers

Target Audience: at-risk youth ages 15-18

Viewing Audiences

Digital Artists and Professional Videographers

Industry and green-tech entrepreneurs

NGOs, Non-Profits and Industry Watchdogs

Sustainable Systems and technologies

Rainwater Catchment 10,000 gallon system

Smart Irrigation with wireless sensor network

Digital Narratives for Public Spaces

Next Steps: Mobilizing the model with the Art CRAWLER

The Art CRAWLER developed by UCSC Digital Arts and New Media (DANM) MFA student Sean Pace, offers an exciting array of digital modeling, fabrication and projection tools that could allow our team to take the ASCEND model on the road (literally!).

Remember Bookmobiles? Operating on a similar premise, The CRAWLER would allow educational organizations lacking the resources to establish their own prototyping and digital media labs to benefit from this mobile studio.

ASCEND can use the CRAWLER's capabilities to take our dual apprenticeship model further and farther afield serving communities that might not otherwise be able to sustain the model.

Related Publications ***(1) Ball, T. & Isaacson, M.*** *(2015) Digital-Storytelling for Apprenticeships in Sustainability Science and Engineering Design.* Paper presented at the 122nd American Society for Engineering Education Conference. Seattle WA, June 2015. **; (2)j) *Ball, T., Beckett, L., and Isaacson M., (2015) Formulating the Problem: Digital storytelling and the development of engineering process skills.*** Paper presented at the IEEE Frontiers in Education Conference, El Paso TX, October, 2015.