Advancing Informal STEM Learning Through Scientific Alternate Reality Games

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An **Alternate Reality Game (ARG)** is an interactive story in which players work collaboratively to piece together and advance an adaptive narrative that is integrated into real world media and spaces, including museums, social media sites, print novels, text messages, mobile apps, and the Web.

Learning Outcomes

O-1: Players demonstrate increased knowledge of **computational thinking** and **deep-time sciences**

O-2: (A) Players practice and/or improve their application of **scientific inquiry skills**, and (B) players demonstrate increased awareness of their scientific inquiry skills through game play.

O-3: Players demonstrate increased **engagement** with STEM concepts across **different media channels** (e.g., print, video, museum artifacts, social media)

Research Questions

RQ-1: Which properties of ARGs effectively promote the informal **learning outcomes** listed above?

RQ-2: How can ARGs be customized to **embed assessments** of players' STEM-related learning as natural components of gameplay?

RQ-3: Which techniques are most effective for **co-designing** informal learning ARGs with **teens**?

RQ-4: Which strategies make ARGs **reusable** across both formal and informal learning environments?

Game 1: DUST – Coming Fall 2014

Target Audience: youth ages 13-15, particularly females & other groups underrepresented in STEM

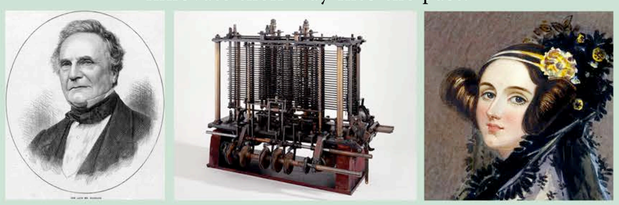
http://dustgame.byu.edu/

When a meteor shower disperses mysterious clouds of dust into the earth's atmosphere, adults worldwide fall unconscious, leaving teens to take matters into their own hands to search for answers that will save their parents' lives.

Teen players will develop skills in scientific inquiry as they collect data via mobile and web apps, research deep-time sciences (astronomy & evolution), develop and debate hypotheses, and take action to save the world.

Game 2: Coming Fall 2015

Players must collaborate with characters from another era to uncover a modern-day plot to destroy humanity. Teens will develop skills in computational thinking as they solve puzzles, decrypt messages, and innovate their way into the past.



Goal: realize the potential of ARGs as novel, transformative tools for informal STEM learning

Teen Co-Design

- Weekly co-design sessions with ~39 teens February - April 2014
- Three locations in Washington DC & Provo, Utah
- Sousa Middle School: 99% Black; 1% Hispanic
- Stuart-Hobson Middle School: 88% Black 10% White; 1% Hispanic; 1% Asian.
- Dixon Middle School: 60% White; 32% Hispanic; 3% Asian; 2% Native American; 1% Black
- Design prompts focused on plot & character development, game activities, and website wireframing
- Goal of the sessions to gather data informing both game design and later summative evaluation of DUST

Game Reusability

Our objective is to increase the **longevity** of both games by designing them so that they can be **replayed, adapted** to new environments, and/or **extended** for new audiences.