The Elements Unearthed:

Documenting the History of Chemistry Through Student-Created Vodcasts

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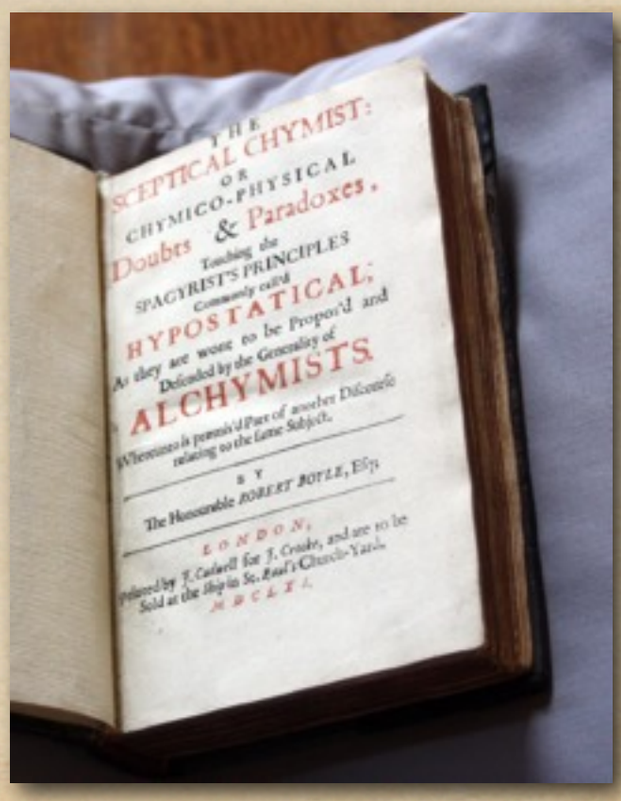
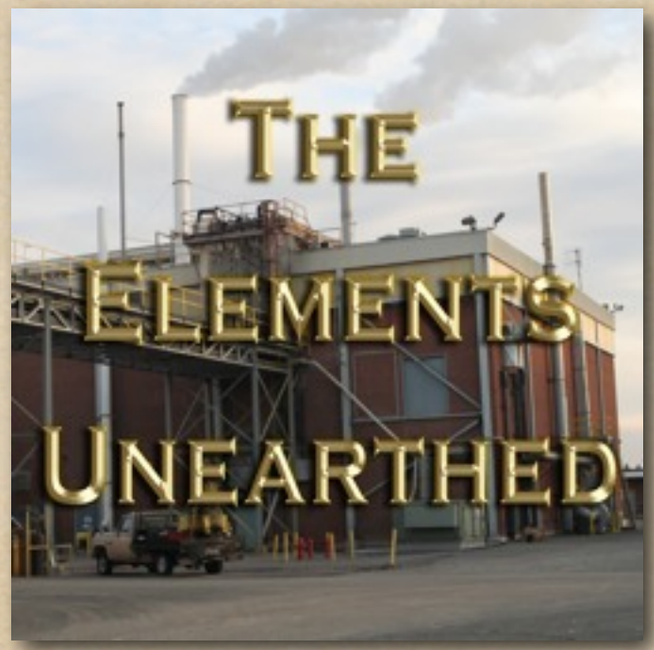
Who is this Presentation For?

- Earth Science and Chemistry teachers (for use in classroom)
- Students in grades 8-12
- Anyone who wants to learn more about creating video for the Internet and using Wikis to collaborate
- Teachers interested in involving students in any authentic, meaningful, challenging project
- Anyone interested in the history of science



Background & Overview



- Podcasts vs. YouTube: Internet Video
- Our Project - Concept, Rationale, History, and Future
- Examples of sites we've visited
- Process & Outcomes
- What we've learned
- How you can get involved
- Questions & Answers

Podcasts vs. YouTube

- SD or HD
- Need a website to host videos (iTunes only links to your site as an aggregator)
- Uses RSS to notify subscribers of new videos
- Podcast = Series
  Episode = Single Video
  (Metadata for each level)
- Audio, Enhanced Audio, and Video: any length
- iTunes U for educational content (+ .pdf files)
- More selective, higher quality on average

- SD or HD
- Don't need a website; YouTube stores your videos for you
- Uses e-mail to notify subscribers (can post direct links to e-mails)
- Playlist = Series
  Videos often in segments
- Video only: <10 minutes
- Huge selection; hard to find what you want, competition for audience
- Anything by anyone; overall quality lower

Our Project: Concept

- Document the history, sources, uses, mining, refining, and hazards of the chemical elements and industrial materials through Internet videos.
- Use community-based teams (students, community members, etc.) to document local history.
- Collaborate with Subject Experts: scientists, engineers, or historians from local museums.
- Integrate video and Web 2.0 technologies with science, history, geography, art, and writing.
- Primary audience is the student teams, secondary is science teachers and their students, tertiary is general public.

Our Project: Rationale

Val Roberts, a 31-year old Deseret farmer, kneels beside well he wants to build home, but cannot get federal loan because well exceeds set arsenic standards.

By Vern Anderson
Associated Press Writer

Arsenic Ruling Upsets Millard Area

DESERET, Millard County — Val Roberts is puzzled because the federal government says it can't give him a loan to build a house since there's too much arsenic in his well water.

He's confused, says Roberts, because the arsenic level in nearby Hinckley is higher than in Deseret, although folks in Hinckley can get the same type loan he wants.

Roberts said the root of the problem is "regulators agencies enforcing arbitrary rules regardless of how it affects you.

"I don't think it's right," said 35-year-old father of six.

"If arsenic is really harmful to them we don't want to drink it, we don't think it is."

Twice Level

The Farmers Home Administration says the water in Roberts' area contains arsenic at a level just under 50 parts per billion — twice the level of 50 parts permitted by state and the Environmental Protection Agency. Arsenic is a

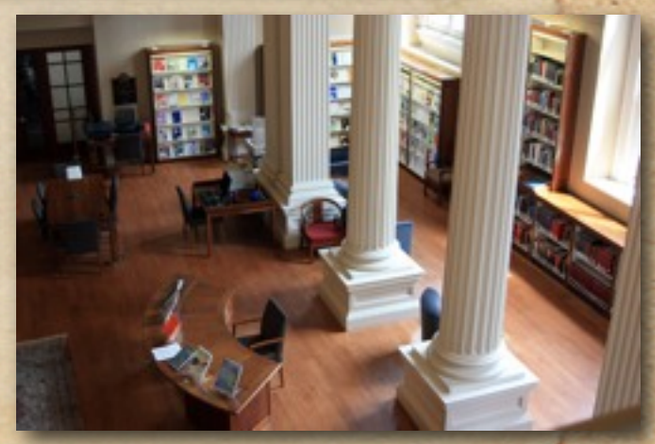
town's water system a "classification pending" rating while awaiting results of an EPA-funded study of arsenic and its effects on area residents. The two-year study will be completed early next year.

Unless EPA allows state officials to grant a variance, Smith said, "It's just a matter of time before we'll have to rule the water system in Hinckley as not approved." Last year, the National Science Foundation recommended EPA not relax its arsenic standard.

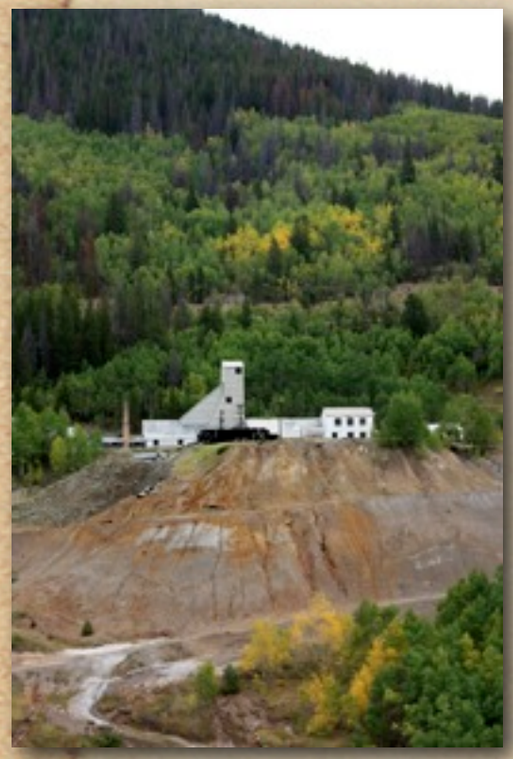
- Enhance chemistry literacy, a one-stop shop for information.
  Ex: Arsenic in Deseret water, HazMat Hell Week.
- Preserve local chemistry history.
  Ex: Tintic Mining District, Novatek
- Improve national resource decisions.
- Encourage students toward STEM careers.

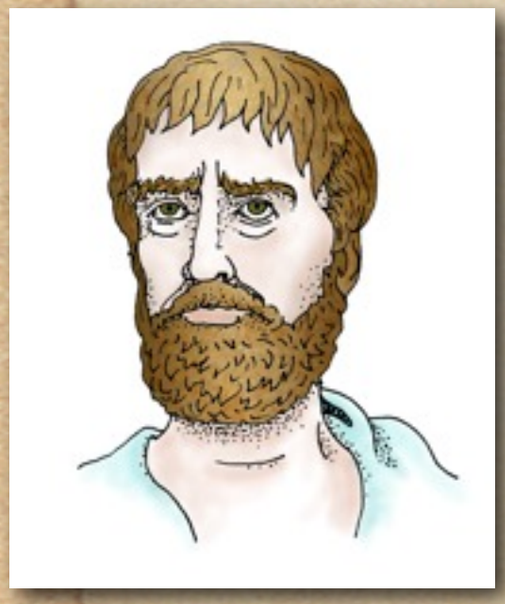
Our Project: History

- 2007-08: Experimental visits - learning how to do this (feasibility)
- 2008-09: Improved procedure - Subject Experts, Wiki collaboration, checklists, better equipment
- Summer 2009: Research Fellowship at the Chemical Heritage Foundation and additional site visits, interviews with experts, and media collection
- 2009-10: Editing footage and images into final videos. Ex: History of the Periodic Table episodes



Our Project: Future Plans (pending funding)





- Phase II: Pilot Project: Expand to teams from other schools in Utah, Colorado and Nevada; effectiveness research. 20 teams over two years, trained on site.
- Phase III: Full-Scale Project: Expand to national project - 20 teams per year for five years, trained on-line.
- Phase IV: Broad Implementation: Ancillary media resources (websites, posters, books, games). 2-3 years. Total of 150-200 episodes.

Example: Cement Manufacturing

- Ash Grove Cement Plant, Leamington Canyon, Utah
- Subject Expert: Jeff Peterson, Plant Manager
- Visit to quarry: Explosion!
- Saw entire process from mining through calcination, pre-heater, kiln, ball mill, and transportation.

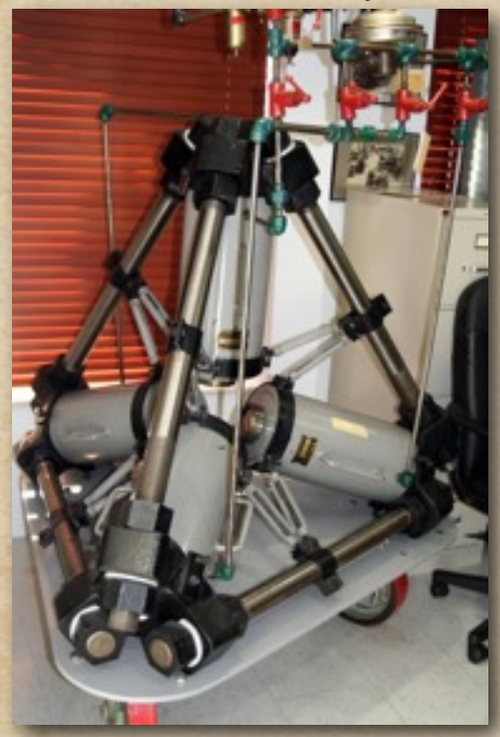
Example: Beryllium

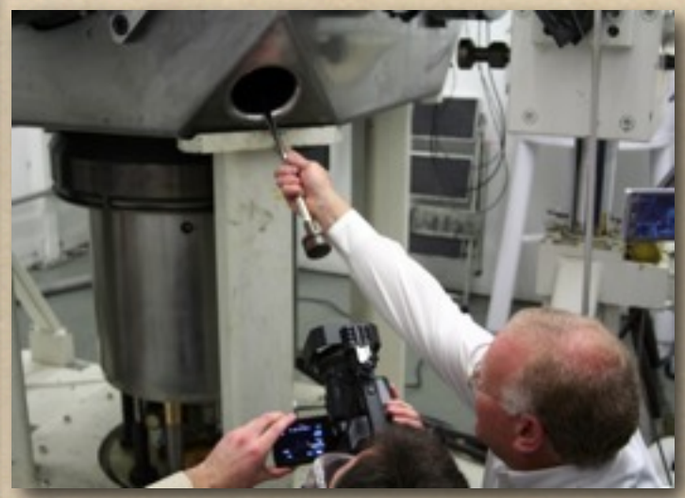
- Brush Engineered Materials beryllium concentration plant near Delta, Utah
- Spor Mt. deposit only commercial source of bertrandite ore in U.S.
- Subject Expert: Phil Sabey, Manager of Technology and Quality

Examples: Glass Blowing

- Holdman Studios, Thanksgiving Point, Utah
- Subject Experts: GayWyn Quance, chemist and glass blowing instructor, Trevor Holdman
- History, process, art, science, and hazards of blown glass
- Demonstrated how to make glass platters

Example: Novatek (Synthetic Diamonds)



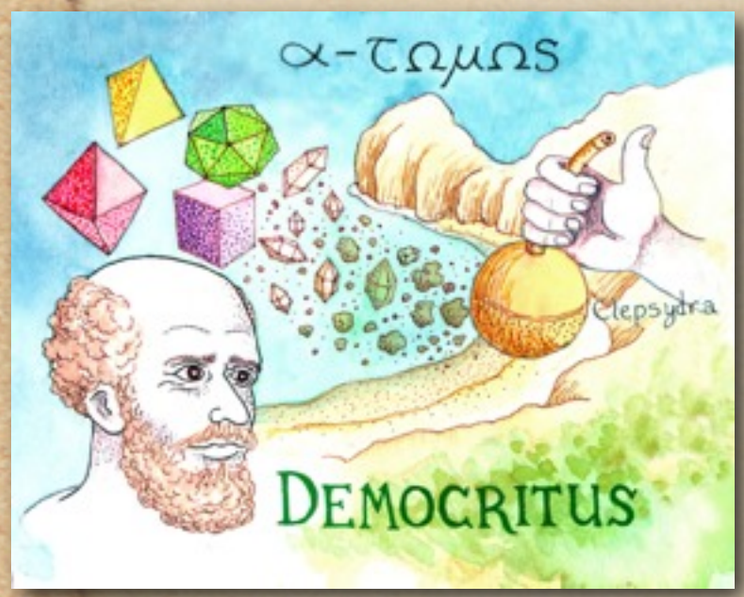


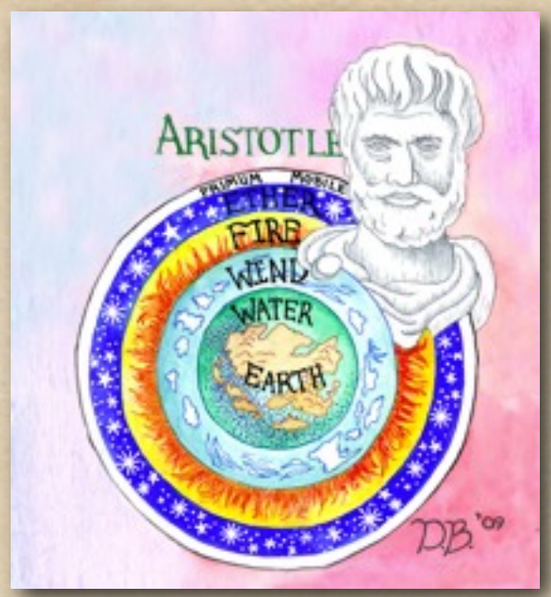
- Owned by David Hall, son of inventor H. Tracy Hall
- Subject Expert: Francis Leany, Project Manager
- Museum of original equipment, photographs, news reports, awards
- History of discovery, new inventions, current processes and uses

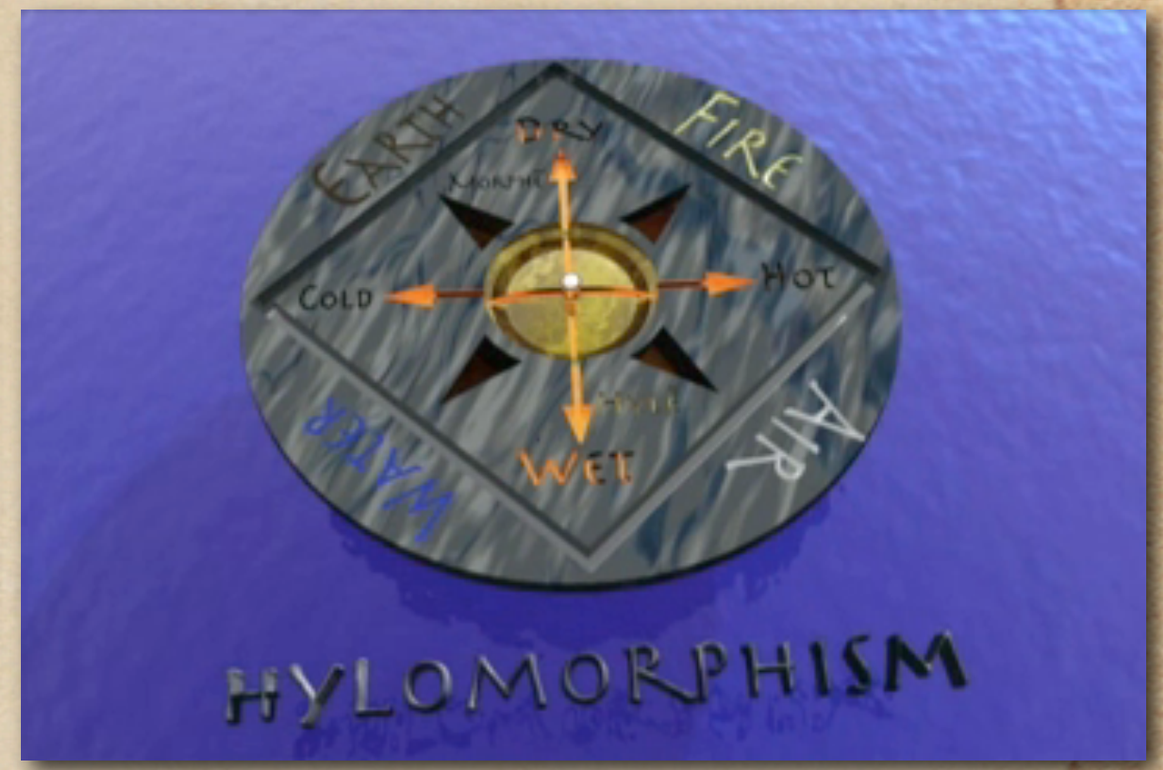
Example: Tintic Mining District (Silver)

- Tours of town and mine sites
- Tour of Tintic Mining Museum
- Subject Expert: June McNulty, local historian
- EPA Super Fund Site: clean-up is endangering the town's history

Example: Greek Matter Theories

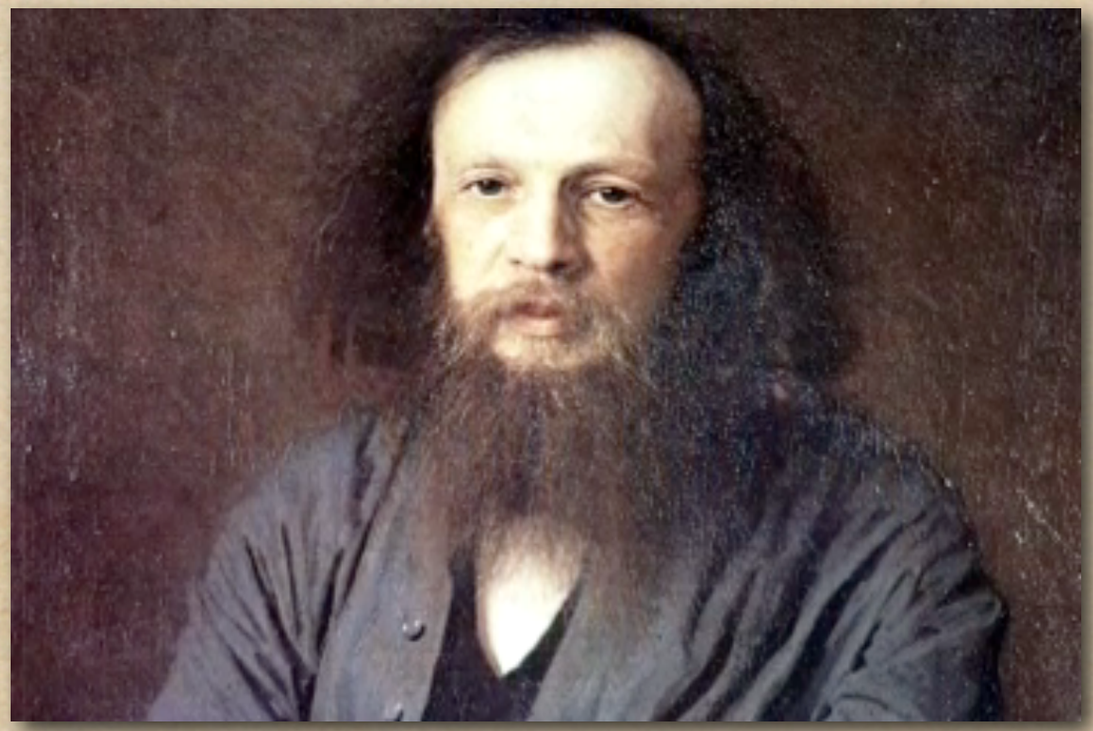


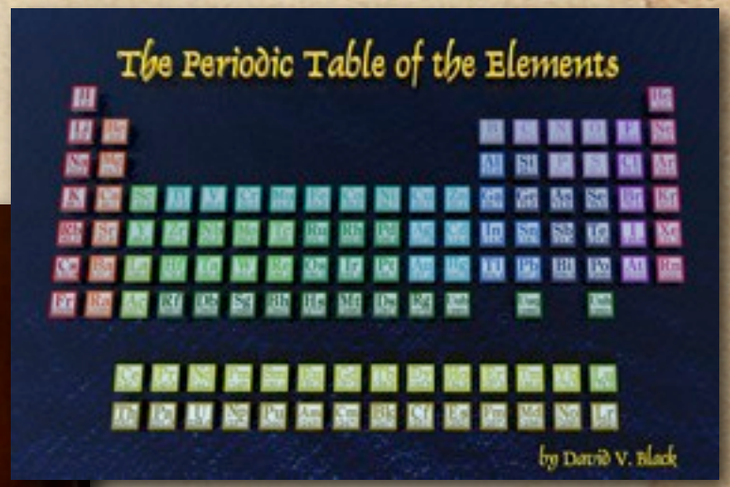




- Researched at Chemical Heritage Foundation
- Original illustrations, 3D animations, book photos (such as Diogenes Laertius)
- Based on recent scholarship of Lawrence Principe, Christopher Lüthy, etc.
- General history topics done by semi-professionals

Examples: Periodic Table History

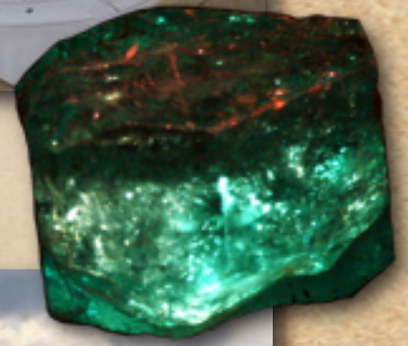




- Interviewed Dr. Eric Scerri of UCLA
- Photographed notes of Edward Mazurs
- Created illustrations and 3D animations
- Two episodes: "Before Mendeleev" and "Mendeleev and Beyond" now on YouTube

Other Examples

- Stained Glass: Holdman Studios, UT
- Lackawanna Coal Mine, PA
- Sterling Hill Zinc Mine, NJ
- Centralia, PA
- Drake Oil Well, PA
- Element Collecting: Theo Gray, IL
- Bonne Terre Lead Mine, MO
- Kansas State Oil Museum, KS
- Kansas Underground Salt Museum, KS
- Minerals: Museum of Natural History, Missouri State Lead Mining Museum, etc.



Process & Outcomes

I.) Research and Planning

A - Choose topic

B - Research and write Wiki notes

C - Collaborate with Subject Expert

D - Develop preliminary script & questions

II.) Site Visit

A - Prepare and learn equipment (checklist)

B - Travel to site, set up

C - Interview expert using prepared questions

D - Videotape site tour

Process & Outcomes, Continued

III.) Post-Production

A - Footage capture, naming, and transcription

B - Final script, with Subject Expert approval

C - Content list and content creation

D - Narration recording and de-noising

E - A-roll edit: Prime footage and narration

F - B-roll edit: Animations, titles, photos, etc.

IV.) Evaluation

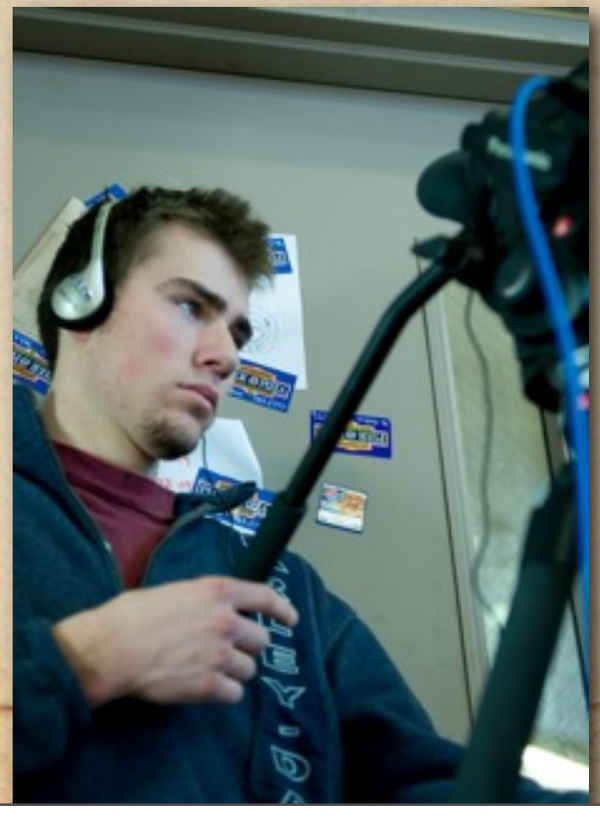
A - Alpha testing (in-house) & editing: technical quality

B - Beta testing (final audience) & editing: content quality, with Subject Expert approval

C - Final exporting, compression, metadata, and uploading

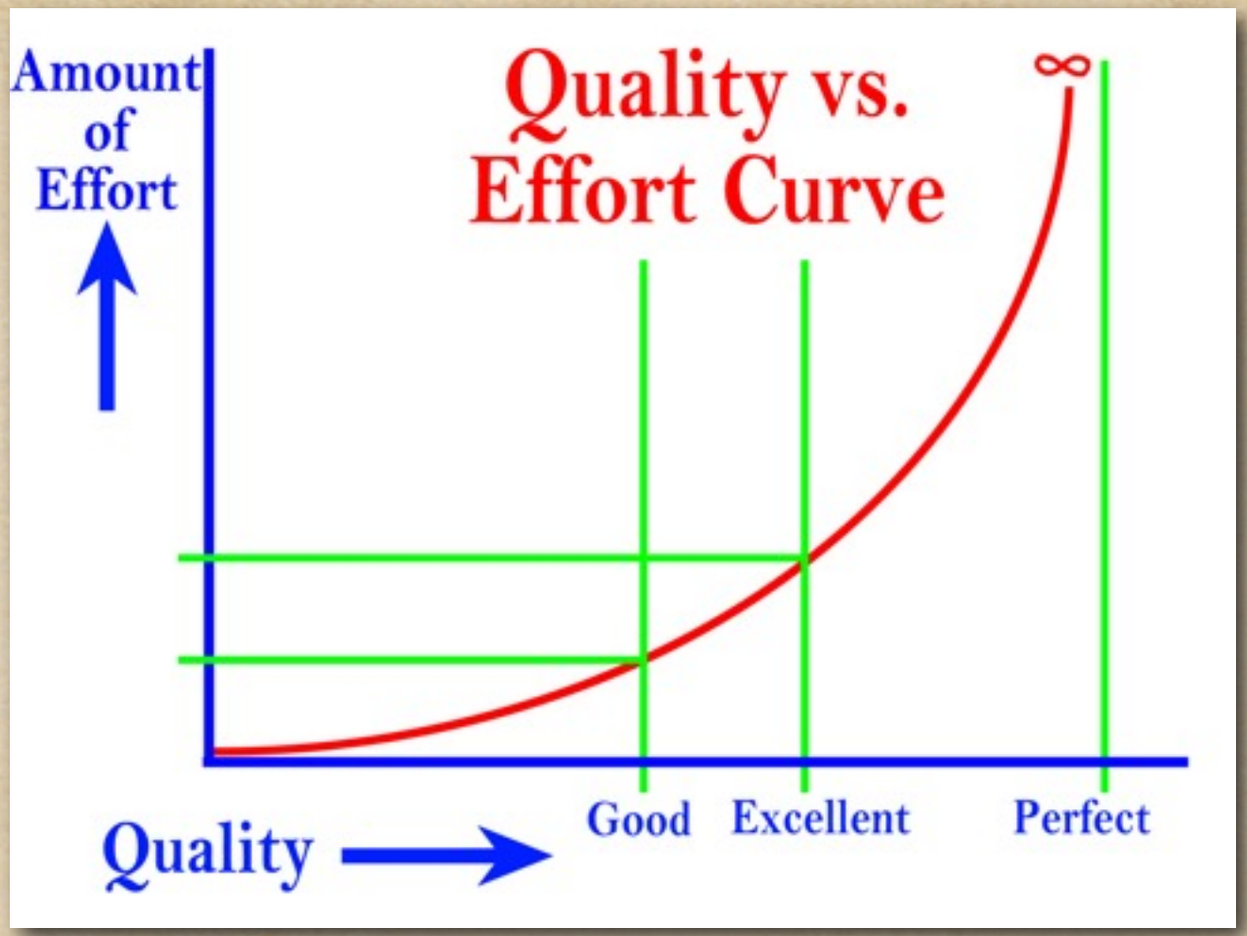
What We've Learned

- Preparation: Set high standards for factual accuracy and video quality. Collaboration between students and with SE ensures depth, accuracy, and eliminates plagiarism. Keep detailed sources (become credits).
- Filming: Know equipment well, including lighting and microphones. Practice before! Use a checklist for preparation, packing, and take down. Use dual system filming and sound. Use tripods!



What We've Learned, Cont.

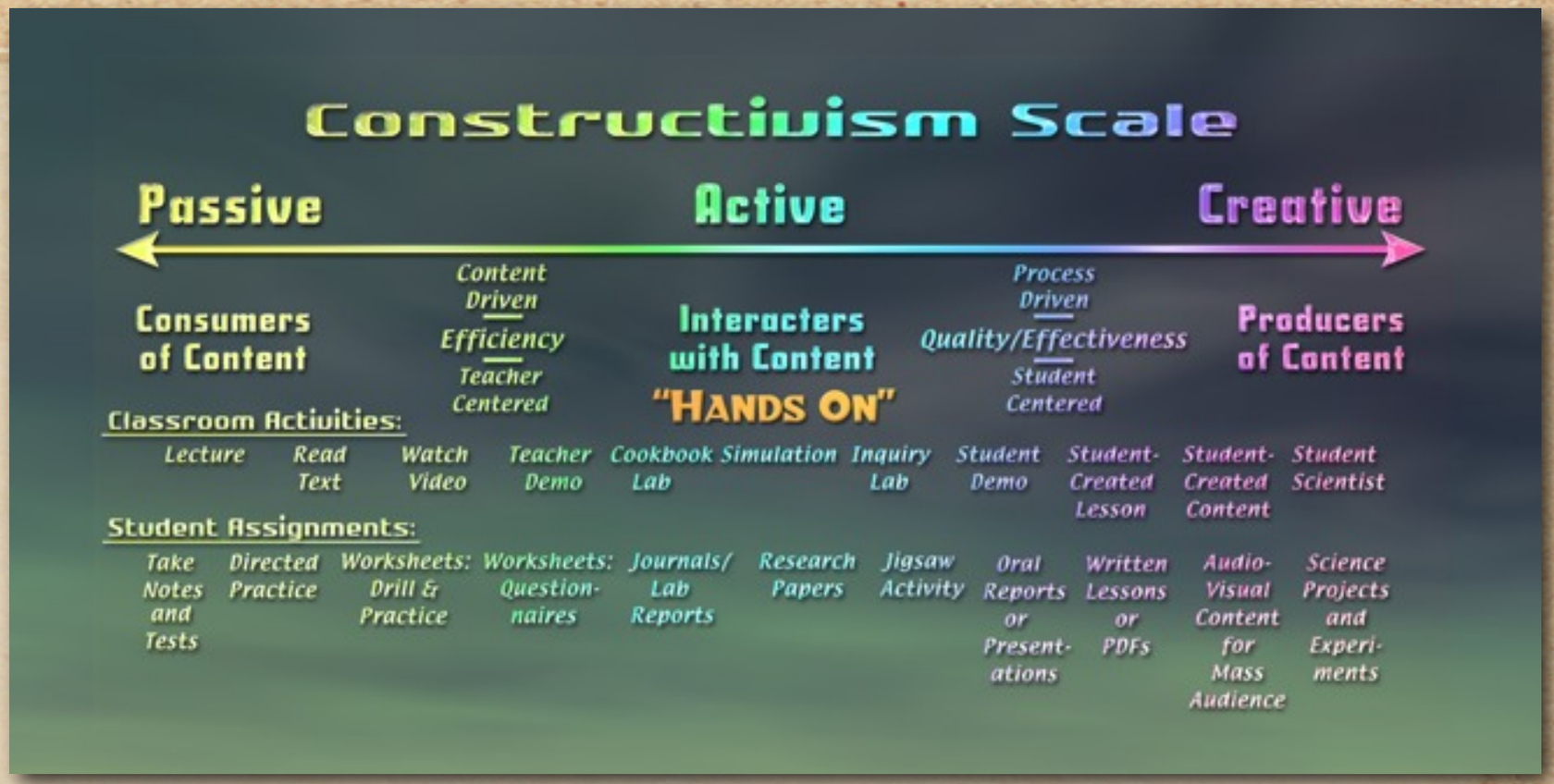
- Post-production: Use actual footage as much as possible; narration minimized, only as "glue." Easy naming system for files. Develop content list and make specific assignments. Follow the script, using only the best of everything. Cut out unessentials.
- Evaluation: Teams evaluate each other (best critics). Constructive comments only - how to fix as well as what. Bring in other students for beta test (don't know project or process). Get SE approval. Keep under 15 minutes total.
- Uploading: Use best quality compression, standard for both platforms (QuickTime). Metadata: say what you need in first two lines. Feedback mechanism.



Quality vs. Effort

- Getting from the start to good quality takes 50% of the time allotted. Getting from good to excellent takes the remaining 50%. Leave enough time to get it right!
- Perfection takes infinite time; it's not possible or desirable.

Summary: Project Core Philosophies



- Student-Created Content (Citizen Historians)
- Beyond Hands-On: Students as Teachers, Authentic Learning
- Integration of science, technology, history, art, and writing
- Collaboration with Subject Experts (exposure to STEM careers)
- One-Stop Shop for detailed, balanced, free information on chemicals, materials, and the elements
- Preservation of local science history: Community-based projects involving local museums

How to Get Involved

Four Levels of Involvement:

1. Use completed videos in class curriculum and send feedback as a teacher.
2. Be Beta Testers: Help with detailed evaluation of scripts and videos created by other teams.
3. Partial Team: Create part of a video (planning, some training, and filming but not editing) or help develop ancillary materials.
4. Complete Project Team: Full involvement (pre-test, planning, research, scripting, training, filming, content creation, editing, uploading, and post-test).

Any Questions?

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