8 Multimedia Didactics

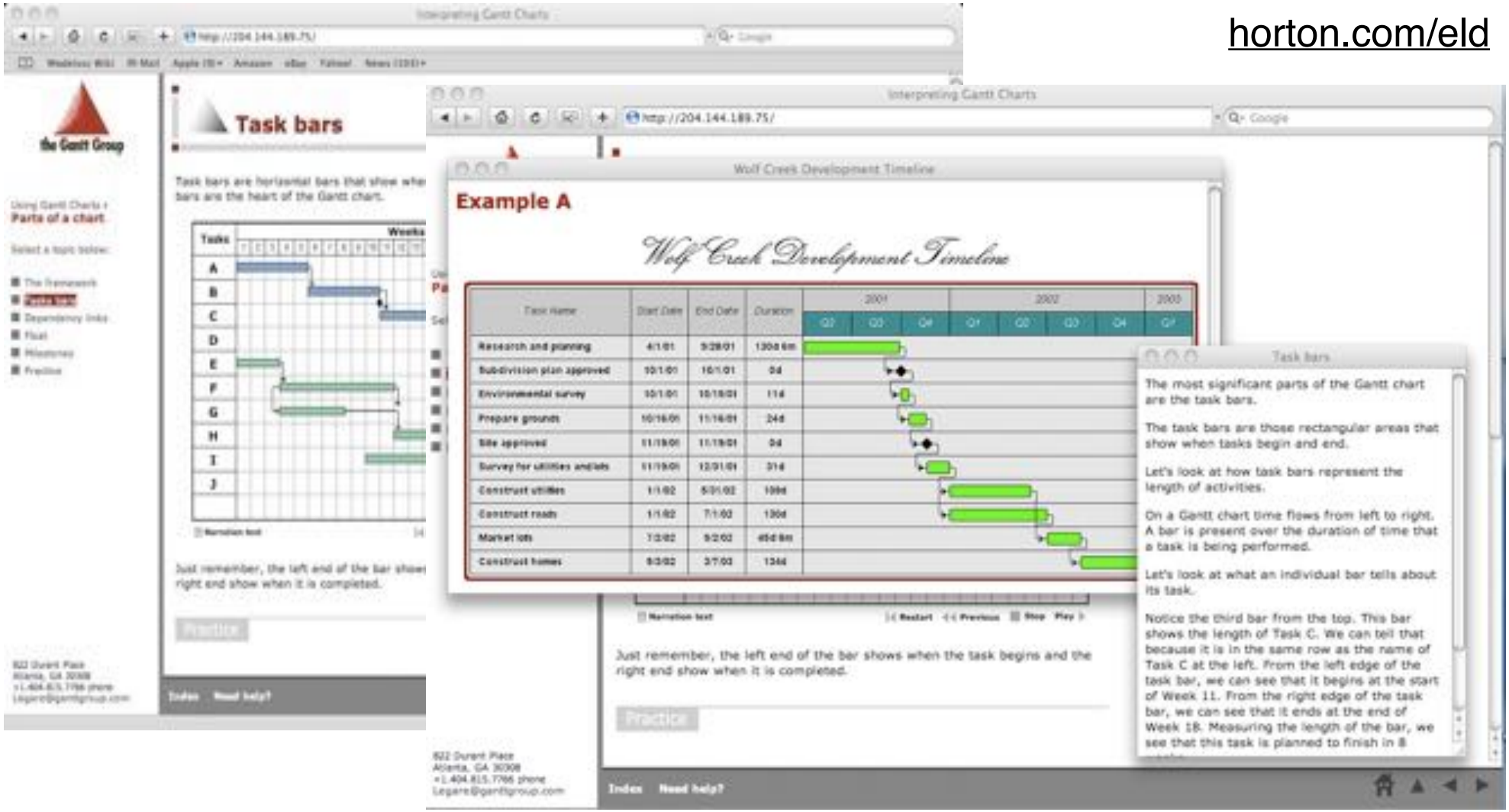
References:

Horton, Ch. 10, see www.horton.com/eld

Niegemann et al., Kap.11+12

Full Screen, One Window, Many Windows?

horton.com/eld



Can you think of advantages/disadvantages?

Screen and Window Dimensions

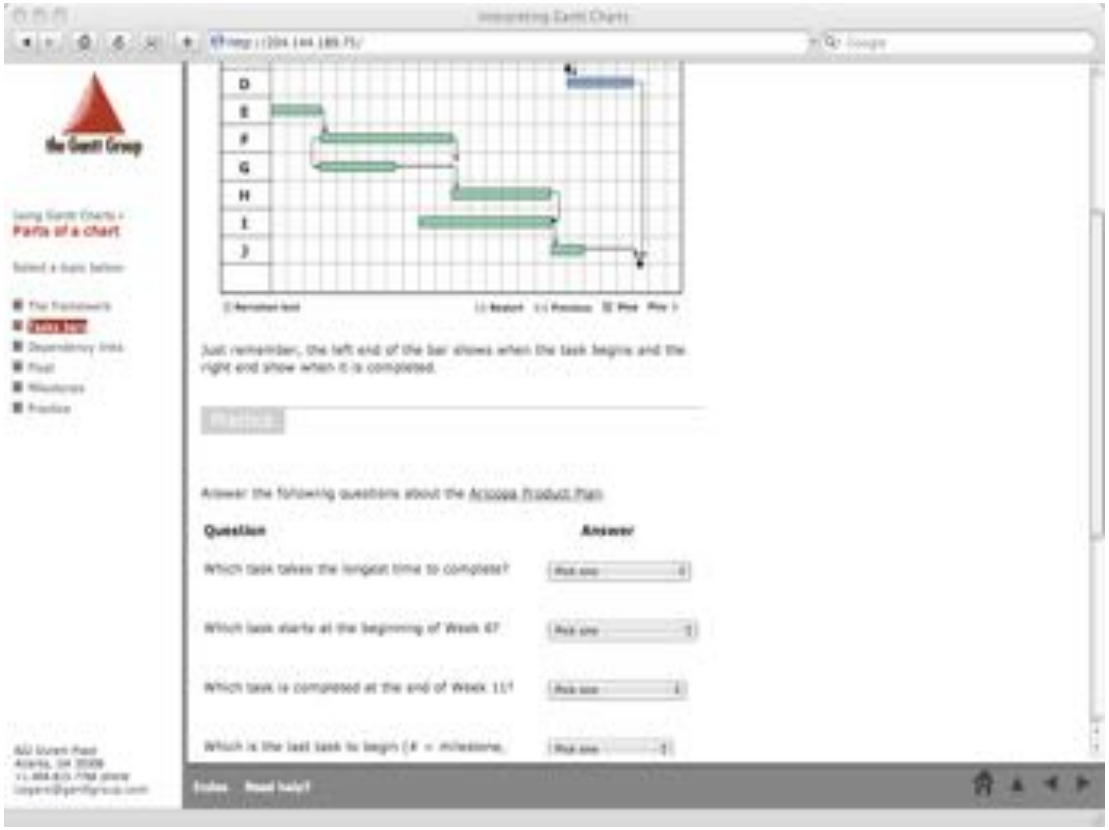
Needed space:
- Content
- Navigation
- Identification, status
- Embellishments

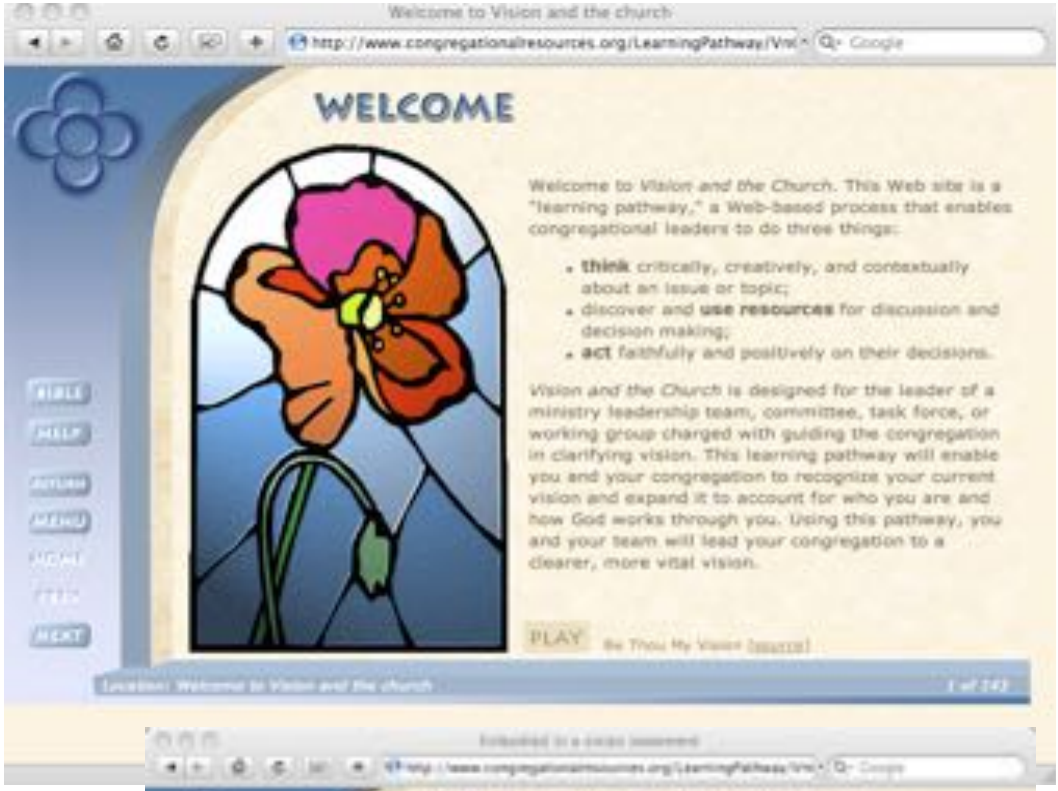
Adaptation to screen size:
- Different versions
- Configuration
- Responsive design

Window Format

- Aspect ratio
- Portrait or landscape?
- Materials with fixed format
- Special applications

Scrolling / Non-Scrolling





Layout Types

- Fixed / fluid (liquid) / elastic design
- Mobile devices: adaptive / responsive design

Stages of Text Understanding

- Processing in basal ganglia
  - Unconscious process
  - Saccades
- Semantic-syntactic processing
  - Concepts and relationships
  - Construction of knowledge
- Elaborative processing
  - Connection to previous knowledge
  - Associations, ideas
- Didactic recommendations may contradict each other!:
  - Niegemann et al (p. 163) recommends to include stimuli and suggestions for elaboration in learning materials
  - But: Mayer's coherence and redundancy principles!

Didactic Rules for Text Presentation

- From motivation theory:
  - Information on learning goals (why to read this)
  - Subject-matter structuring (orientation)
  - Didactic structuring (e.g. from simple to complex)
- From cognitive theory of multimedia learning:
  - Completeness and consistency
  - Reduction, conciseness
  - Summaries
  - Close integration with images
  - Spoken text as alternative

Examples for Confusingly Complex Sentences

How can we simplify these texts?

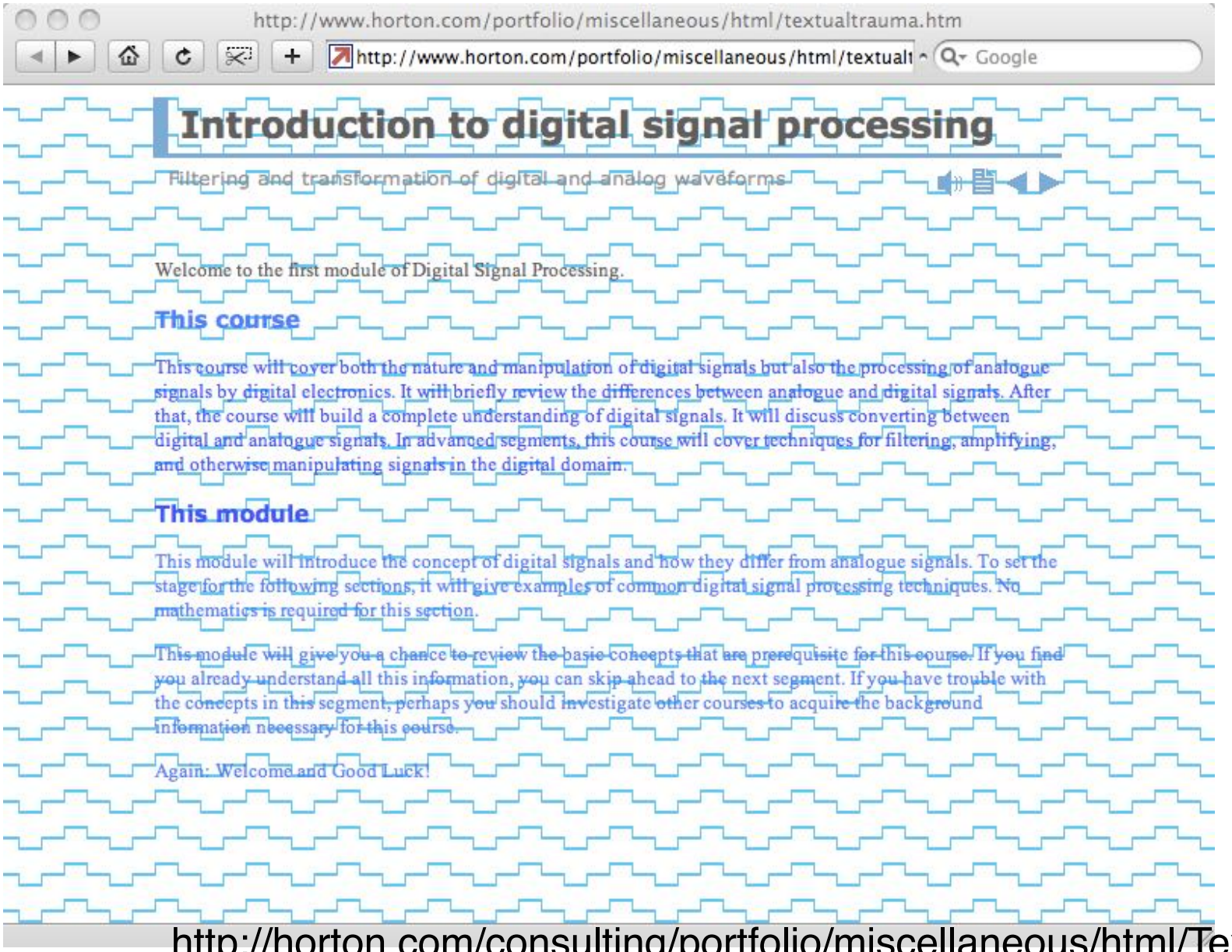
- “High-quality learning environments are a necessary precondition for facilitation and enhancement of the ongoing learning process.”
- “If there are any points on which you require explanation or further particulars we shall be glad to furnish such additional details as may be required by telephone.”
- “Your enquiry about the use of the entrance area at the library for the purpose of displaying posters and leaflets about Welfare and Supplementary Benefit rights, gives rise to the question of the provenance and authoritativeness of the material to be displayed. Posters and leaflets issued by the Central Office of Information, the Department of Health and Social Security and other authoritative bodies are usually displayed in libraries, but items of a disputatious or polemic kind, whilst not necessarily excluded, are considered individually.”

www.plainenglish.co.uk

Design Rules for Text Presentation

- Headings:
  - Based on subject matter, not formal
- Orientation:
  - Datelines
  - Boxes
  - Font, color, …
  - Bullet points, pictograms, …
- Classic typographic rules for screen presentation:
  - Sans-serif font, ideally screen-optimized font
  - Avoid italics
  - Avoid underlining

Background and Readability



http://horton.com/consulting/portfolio/miscellaneous/html/TextualTrauma.htm

Picasso Effect

In out daily lives we often confuse **urgency** and **Importance**. Failing to distinguish these two characteristics can cause us ***stress*** and ***confusion***. Let's see if we can untangle these two different concepts.

Urgency is the desire to do something immediately or at least soon. If something is urgent, we feel we must react at once. Things that are urgent have a deadline attached to them and the deadline is **imminent**.

Importance is the recognition that something will have a **major** effect on our lives or work. Something can be important, however, without being urgent. It is important that we begin saving for our children's college education, even though they may be years away from departing for college.

If the things that were **urgent** were always **important**, the distinctions between these two concepts would not be so ... important. **Problems** occur when things that are important are overshadowed by things that are merely urgent.

Obviously something that is both **Important** and **urgent** should be dealt with immediately. But what about something that is urgent but not important or something that is important but not urgent?

This Lesson will help you handle Those situations.

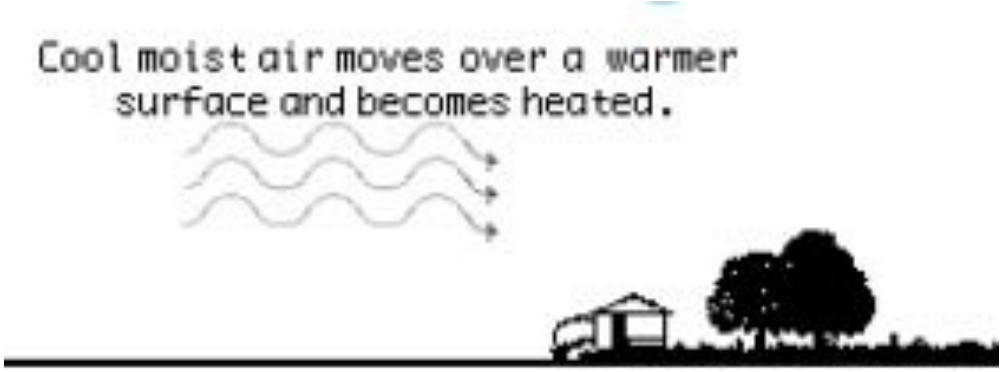
Continue

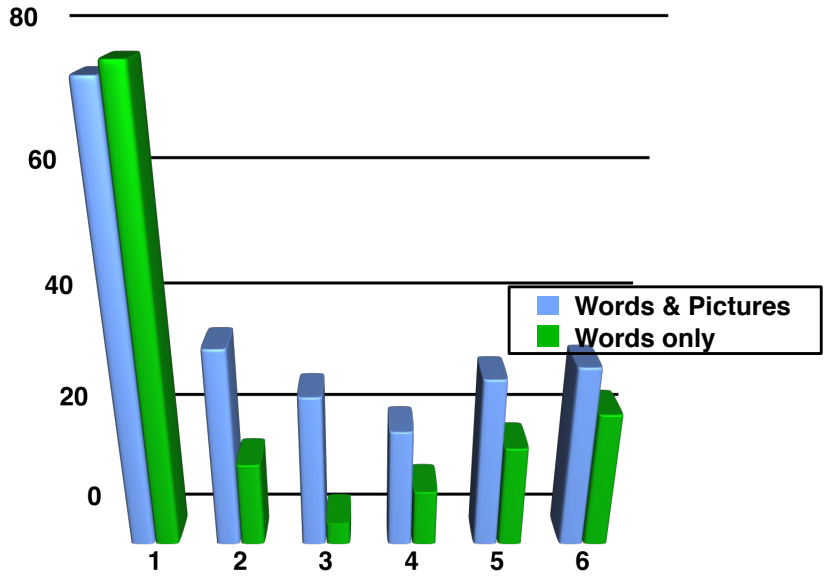
Stages of Image Understanding

- Pre-attentive processing
  - Overall impression
  - Scanning of the image (saccades)
  - Figure-ground perception (Gestalt factors)
- Attentive processing
  - Detail inspection (voluntary eye movements)
  - Parallel linguistic processes
- Elaborative processing
  - Connection to previous knowledge, interpretation

Types of Images

- Depictions
  - Representing parts of reality
  - Possible: Subjective viewpoint
- Diagrams
  - Charts, Tables, visual languages
- Abstract representations
  - Symbols and metaphors

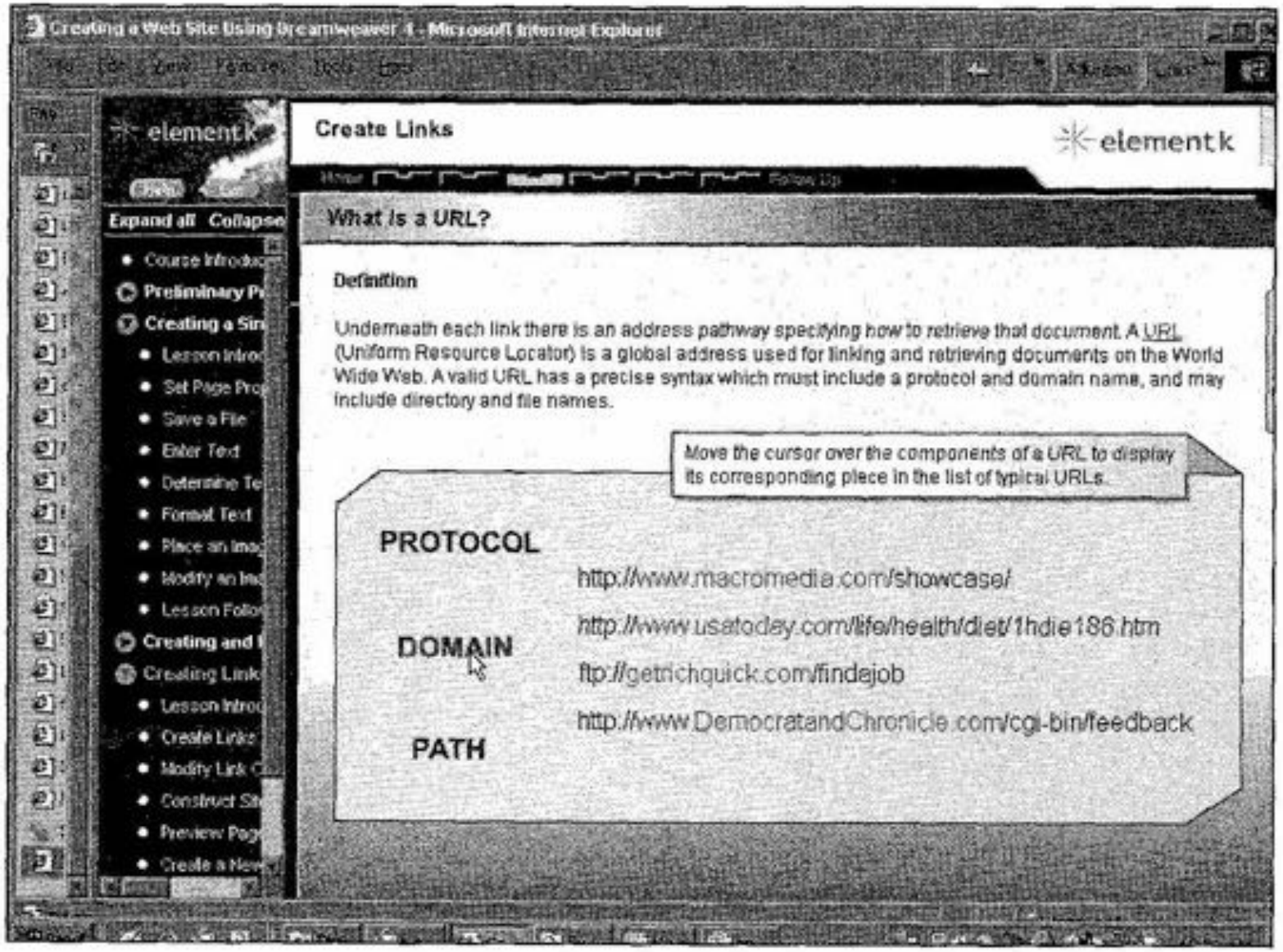




Didactic Questions on Images

- Which previous knowledge exists when image is perceived?
- What is the instructional function of the image?
- Are the facts represented in a spatially correct way?
- Is the complexity level right?
- How can we control mental evaluation of the image?
- Which visual organization is suitable?
- Do text and images correspond to each other?
- Is the spatial correlation of text and images adequate?

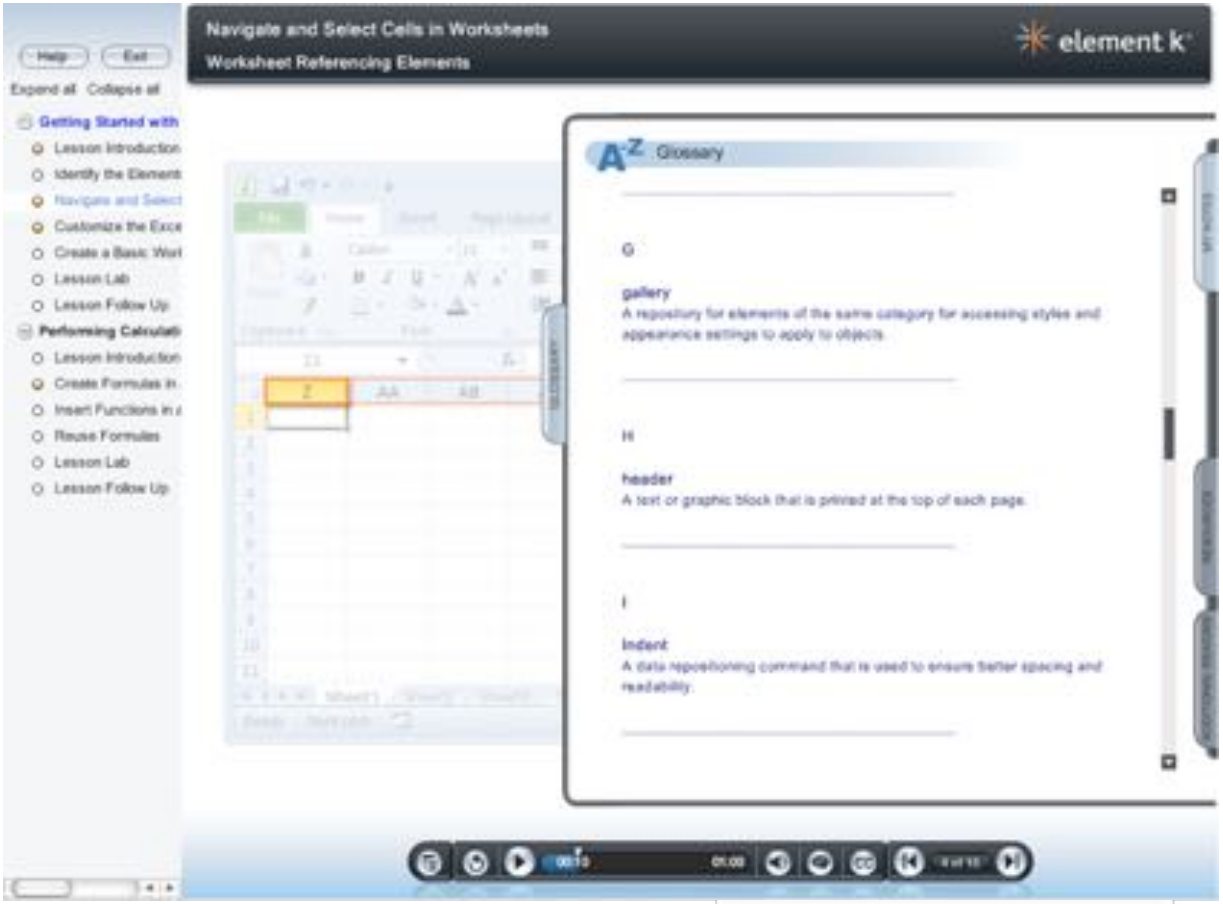
Example: Confusing Graphical Content



Clarification of object boundaries in complex picture

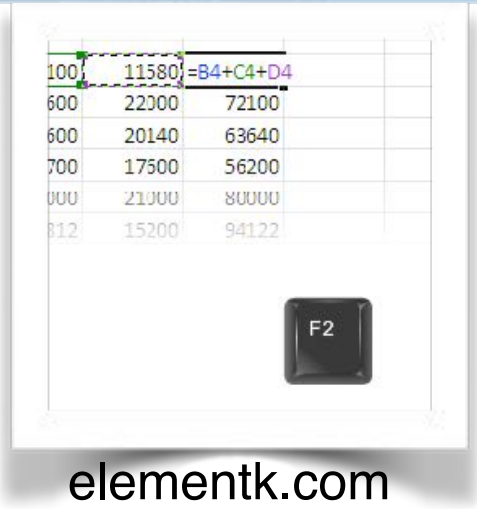
Roles of Graphical Elements

- Topic organizer
  - Graphical table of contents
- Relationship visualization
  - In particular in simulations
  - Show side effects of action (e.g. by measurement and visualization of dependent simulation variables)



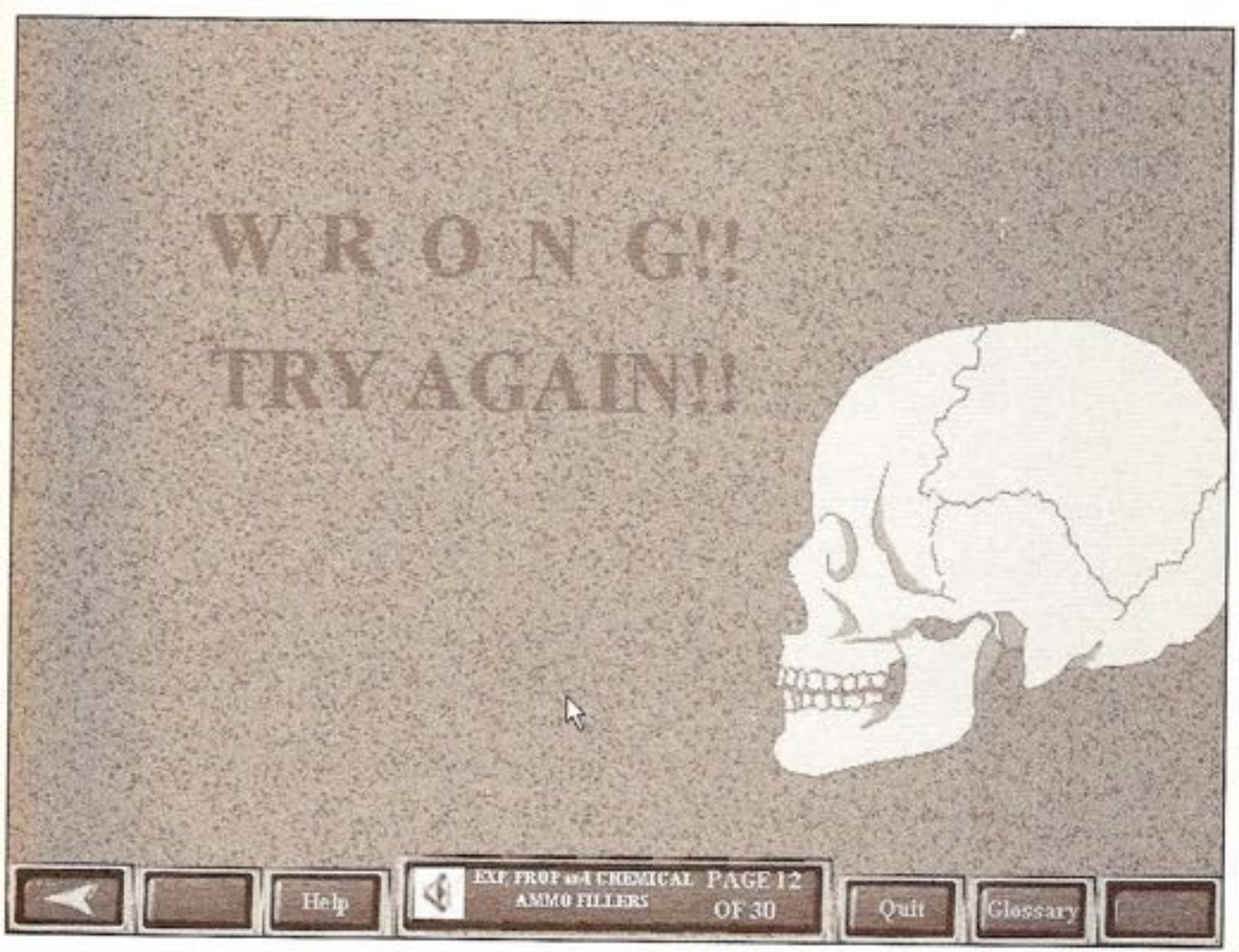
R. Hewitt, learncnc

- Lesson interface
  - In particular in microworlds & simulations



elementk.com

Bad Example...


W R O N G!!
TRY AGAIN!!
Help
EXP PROP of CHEMICAL AMMO FILLERS
PAGE 12 OF 30
Quit
Glossary

Unity Principle

- Consistent design elements
  - Page construction
  - Color palette
  - Fonts and their usage
  - Logos, icons
  - Image types, image usage

8 Multimedia Didactics

8.1 Didactic Design of Text and Images

8.2 Media Didactics for Audio 

8.3 Media Didactics for Animations

8.4 Media Didactics for Video

8.5 Learner Control

References:

Clark/Mayer Chapter 5

Niegemann et al. Kap. 8

Types of Audio Elements

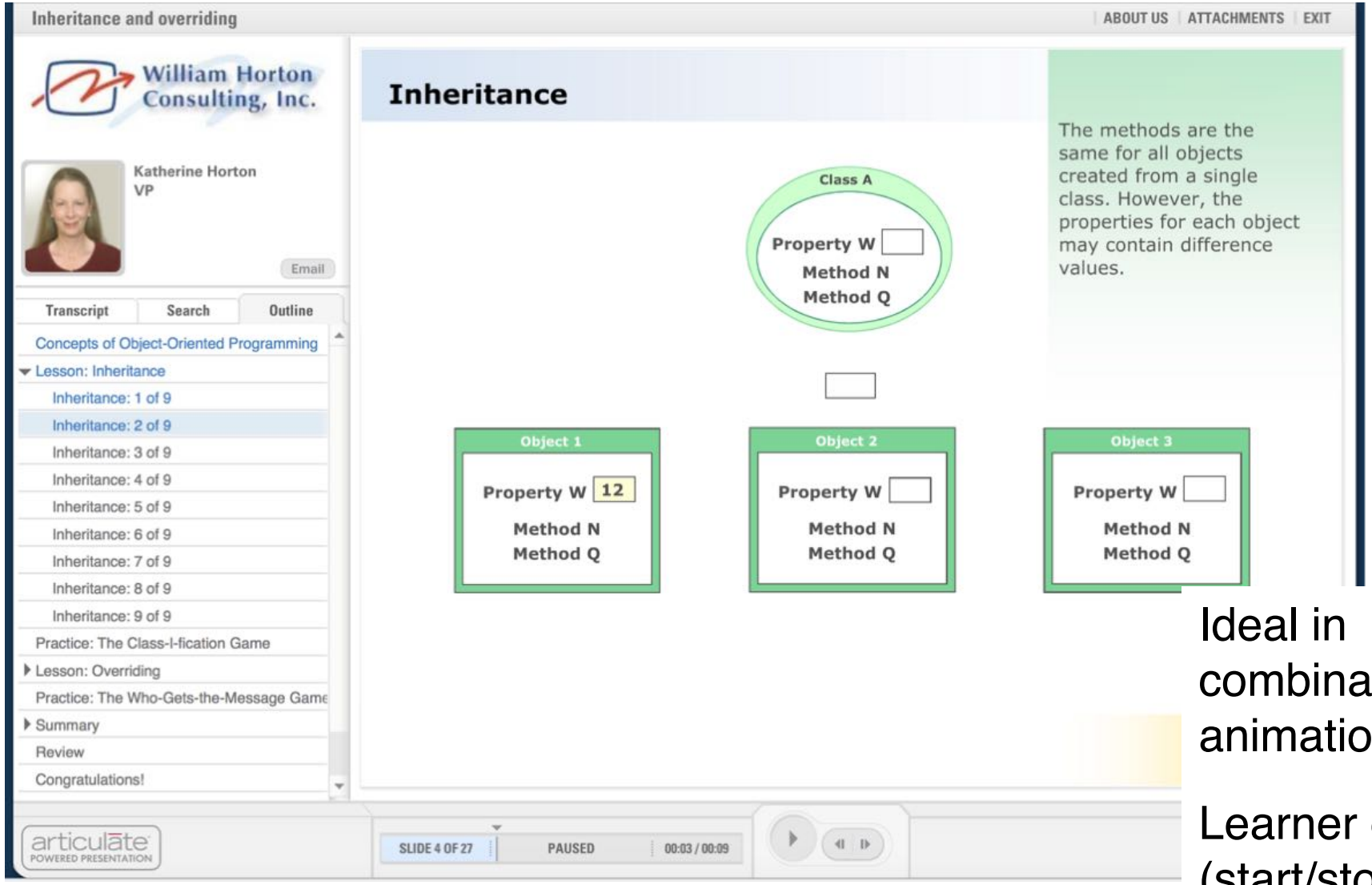
- Speech
  - "Reading aloud" (text also available as visual element)
  - Spoken explanations
  - Narration, dialog, audio play
- Sound effects
  - Confirmation sounds for user interactions
  - Acoustic warnings (e.g. when reaching a time threshold)
  - Acoustic indication of modus (e.g. when displaying results)
- Music
  - Background music
  - Music related to content
  - Music with formal function (e.g. for structuring)
- Note: Pure audio perception without visual support is cognitively quite demanding

Examples for Acoustic Establishment of Context

- Marsellaise
- "Peer Gynt" suite, Edvard Grieg
- Flamenco
- Syrtaki
- Didgeridoo
- Beatles song
- Renaissance dance music
- Themes from movies and TV series

- Note: Cultural and educational dependencies

Spoken Explanations

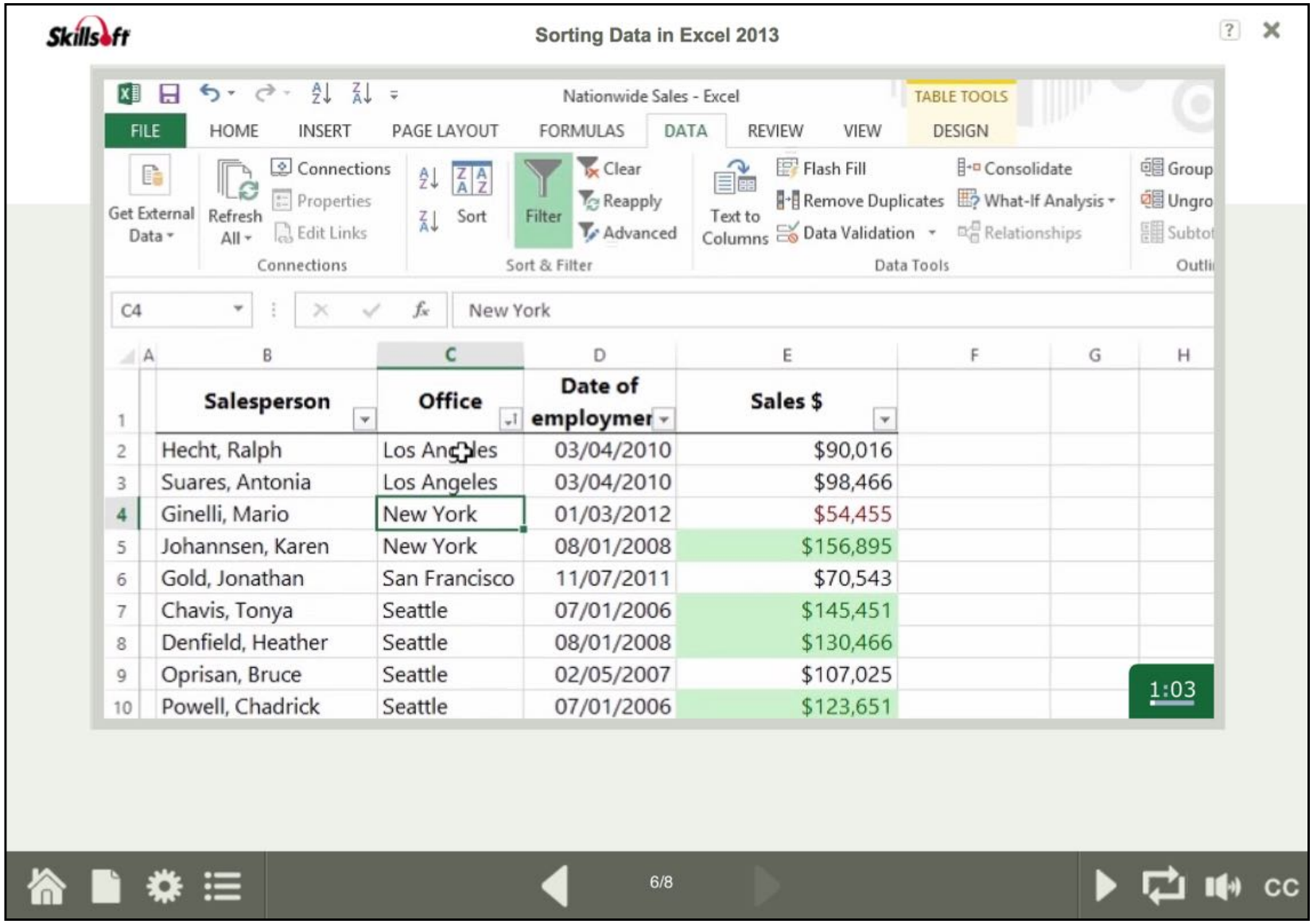


Ideal in combination with animations

Learner control (start/stop) advisable

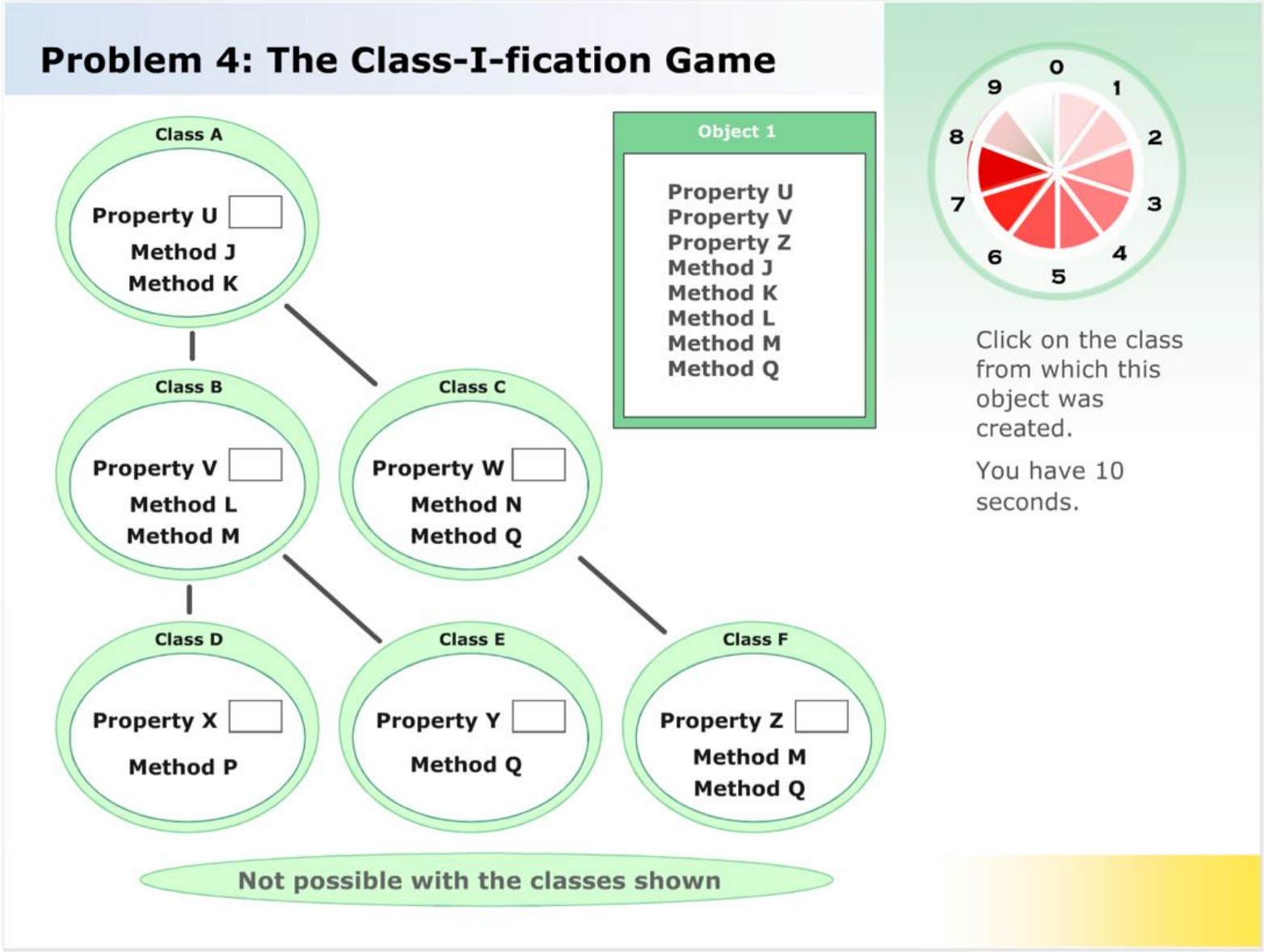
http://horton.com/consulting/portfolio/OOPs/index.html

Audio+Text or Just Audio?



skillsoft.com/coursedemo

Audio in Tests



No sound in practice units and tests - why?

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8.4 Media Didactics for Video

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References:

Niegemann et al. Kap. 9

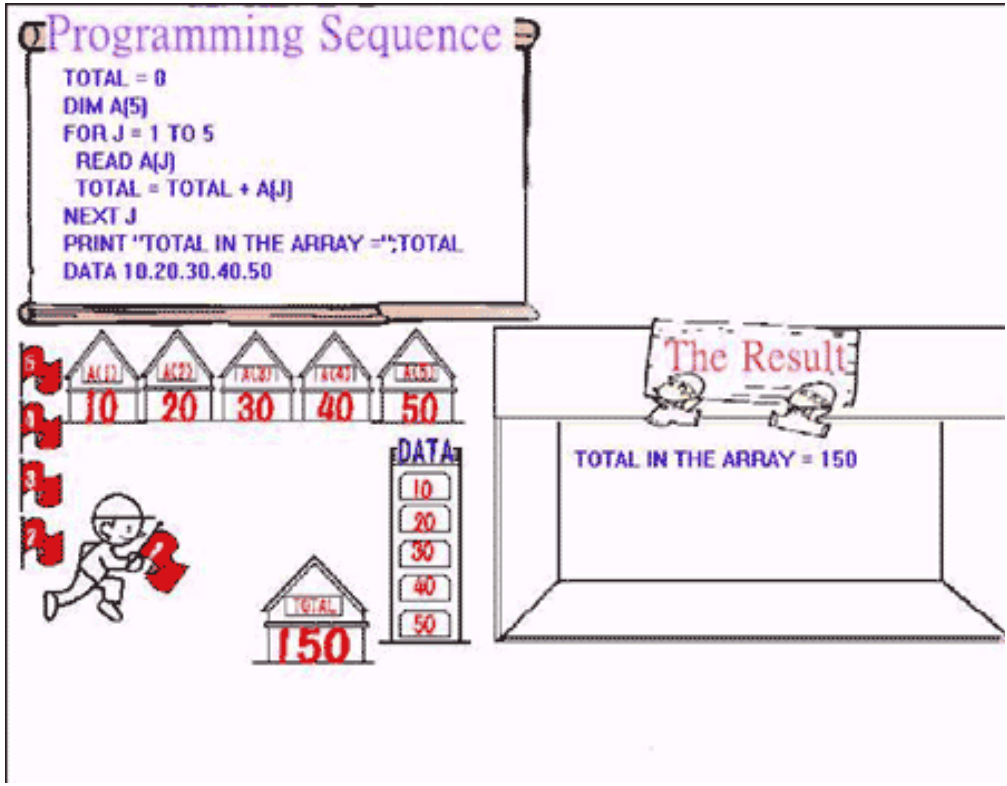
Functions of Animations

- Decoration
  - General assumption of higher attractiveness for learners
- Attention control
  - Does the ARCS model support the usage of animation?
  - Sustaining attention: Do "pedagogical agents" help?
- Content presentation
  - for sequential processes
  - for cause-effect relationships
- Practice
  - with high learner involvement

Recommendations for Usage of Animations

- Prefer simple animations over complex ones
- Learner control
  - Speed control, stop, rewind, fast forward, restart
- Keep animations related to current course content
- Give time for reflection
- Use dynamic, interactive graphics
- Avoid stereotypes and prejudices
- Consider technological requirements

Empirical Results



- Spotts&Dwyer 1996:
  - 63 learners, three groups
    - » Text + image
    - » Text + dynamic visualization
    - » Text + interactive animation
  - Visualization and animation lead to better learning success
- Lai 2001:
  - Simple animations better for learners with low cognitive skills and low previous knowledge
- Niegemann: No evidence for improvement of learning success through "fun factor" alone

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References:

Niegemann et al. Kap. 10

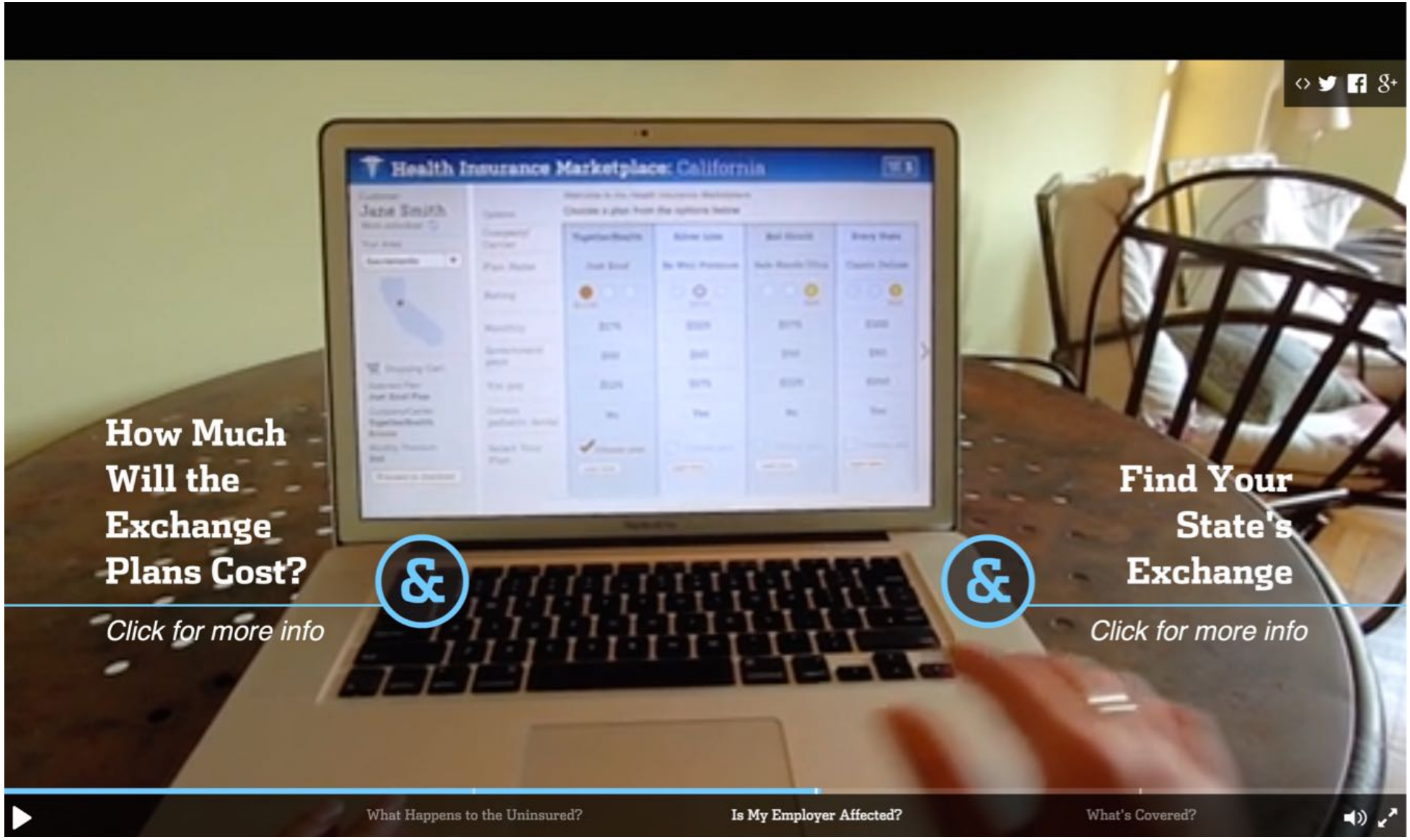
Video and Movie: Old or New Media?

- First "educational movie" probably 1902
- Video presentations used in schools since many years
- Video in multimedia learning
  - Integration with other forms of training and learning
  - Interactivity
  - Digital transmission and storage (e.g. streaming)

Functions of Video

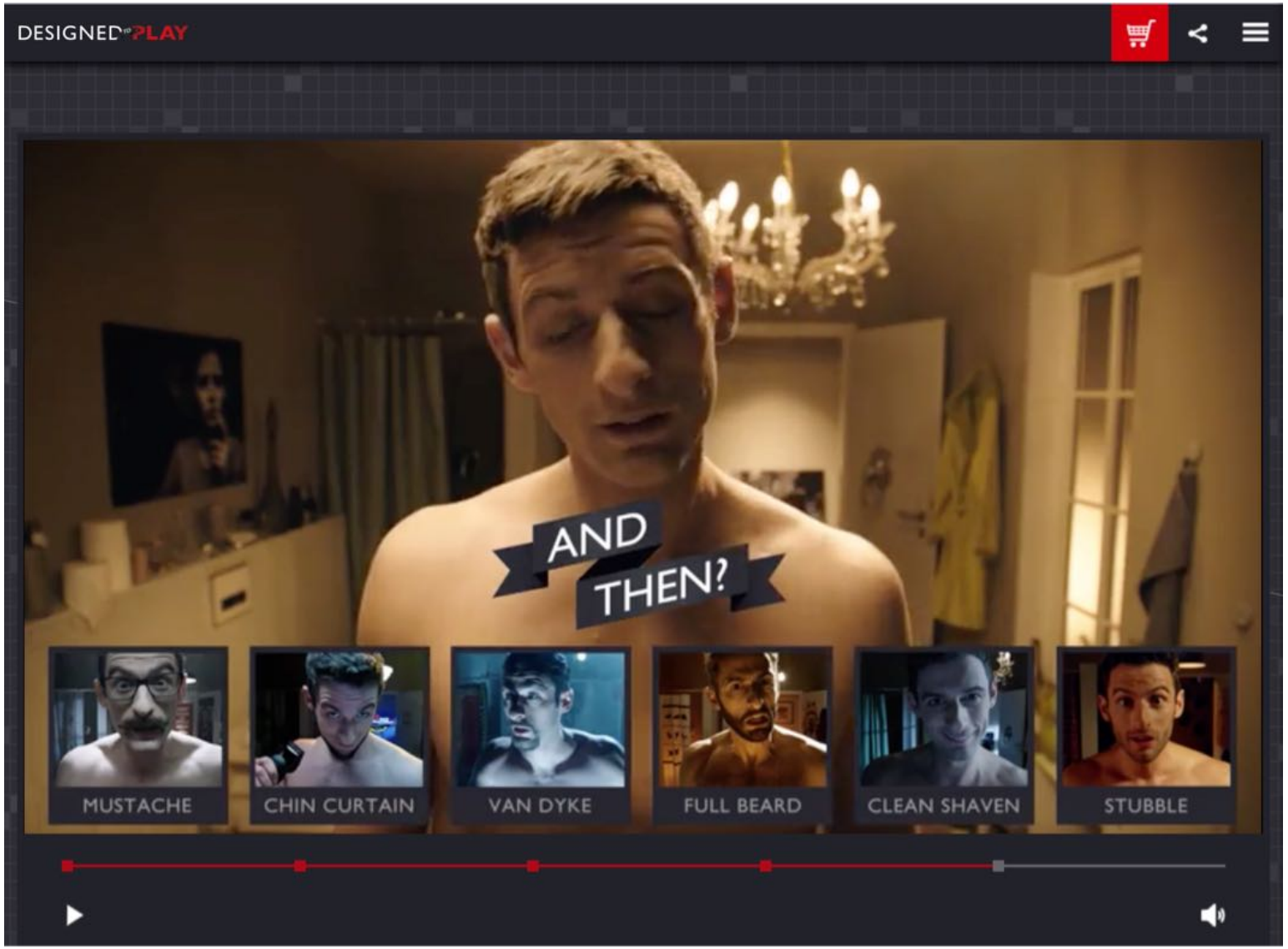
- Information density
- Representation of time relationships (even real time)
- Authenticity, relevance
- Making use of learned skills
  - "language of film"
  - Acquired patterns of understanding for complex relationships
- Multicodality
  - Dual coding, multimedia principle
- Emotion control
- Interactivity
- Note: Avoid extremely short video sequences

Interactive Video – Overlay of Menus



https://watch.zentrick.com/UBOVJn/

Interactive Video - Switching the Storyline



http://www.play.philips.com

Interactive Video - Parallel Stories

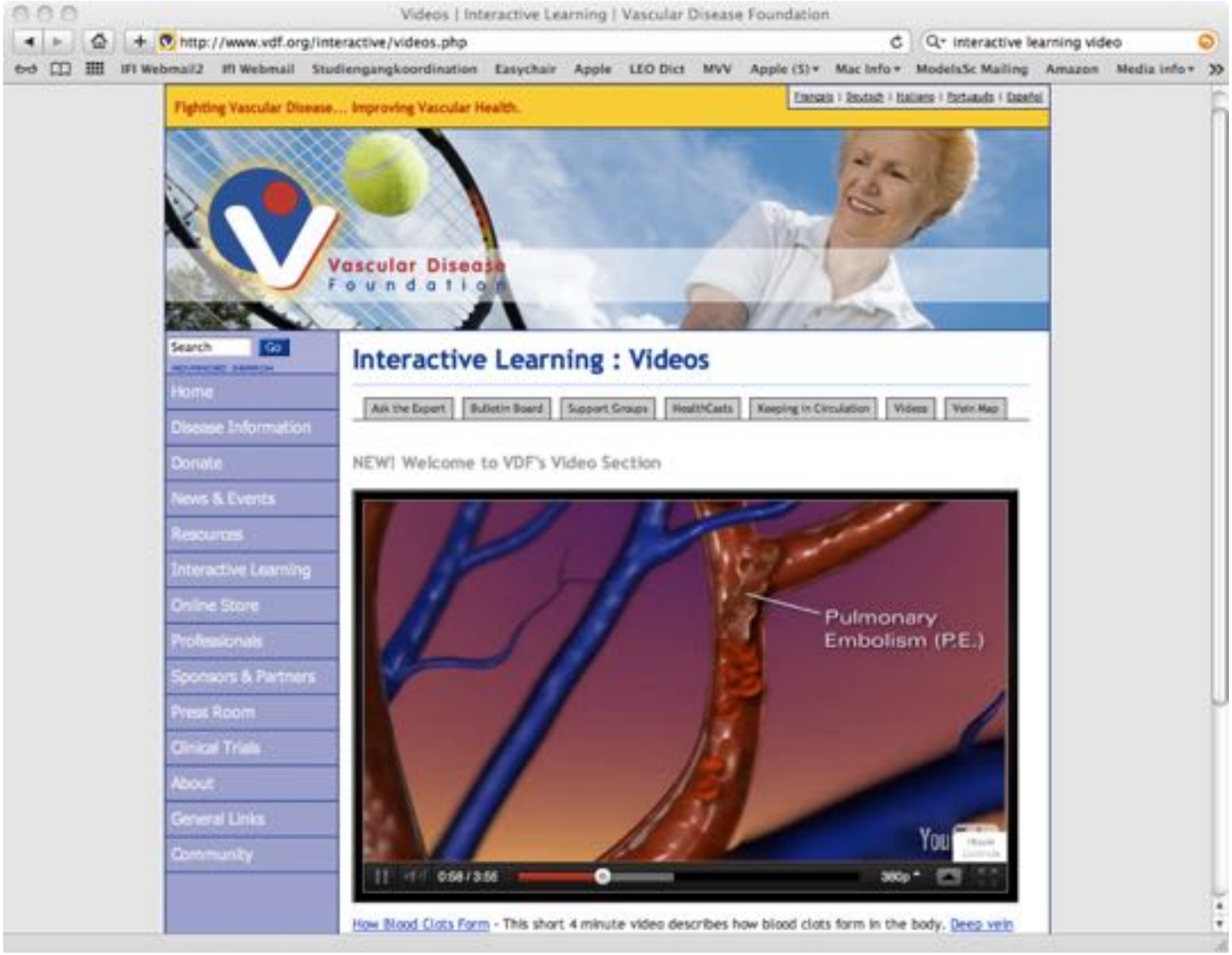
Honda:
The Other Side

http://digitalsynopsis.com/advertising/honda-civic-type-r-the-other-side/

Didactic Recommendations

- Separate video from other material
  - Full screen
  - Clearly recognizable frame
- Adequate structure
  - Linear (easy to understand)
  - Parallel (fascinating)
  - Branching (complex, may be confusing)
- Deal with waiting time for interaction input
  - Still image, possibly with text
  - Video loop
  - Continuing video

Practice of Video Learning: Streaming Clips



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References:

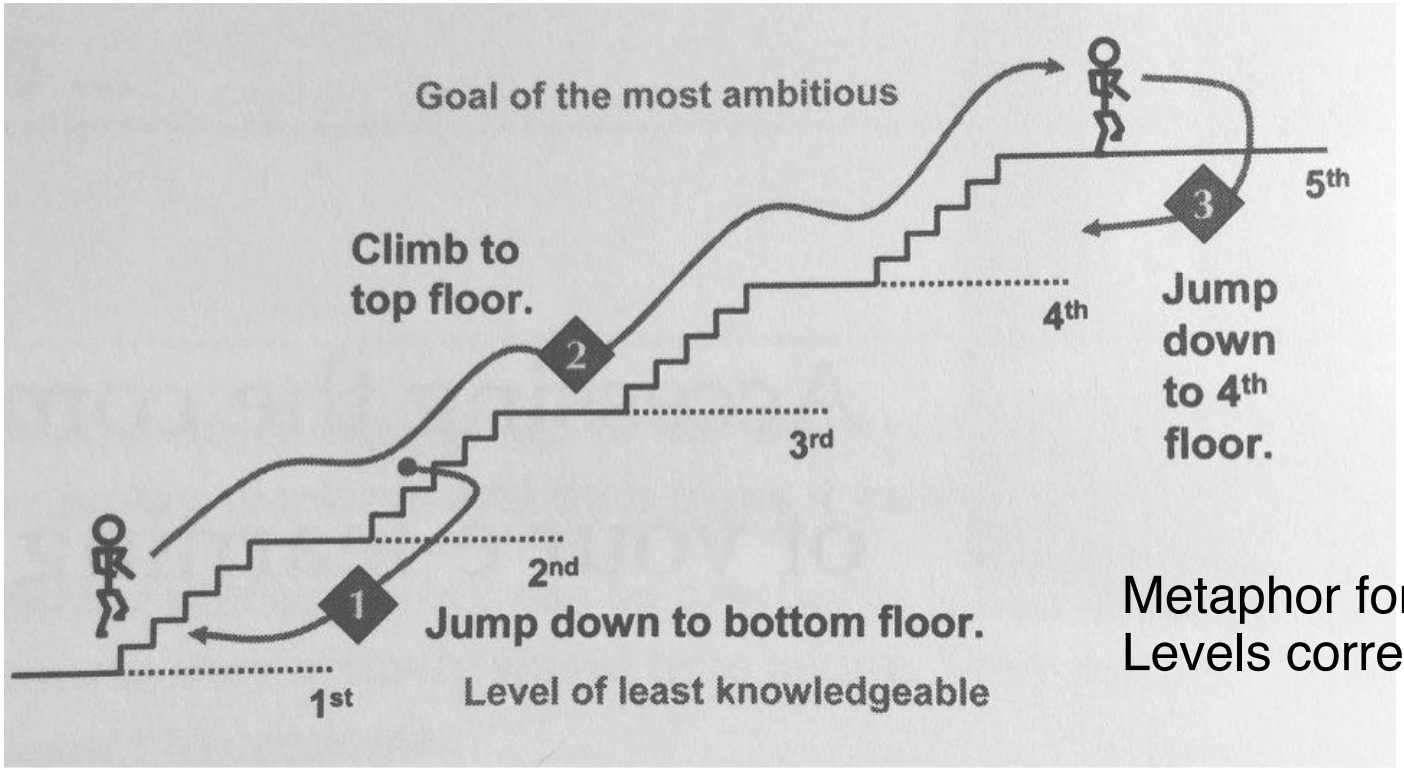
Clark/Mayer Chapter 12:
"Do Surfing and Learning Mix? - The Effectiveness of Learner Control in E-Learning“

Horton Ch. 11

Learner Control vs. Program Control

- Learner control
  - One of the main advantages of e-learning
  - Learners control their learning pace, decide to bypass elements, select teaching techniques
- Program control
  - Traditional model of classroom training
  - Identical pace, linear sequence, same teaching techniques for all
- Detailed classification of control options:
  - Content sequencing
  - Pacing
  - Access to learning support

One-Path-for-All Syndrome (Horton)



Metaphor for course design
Levels correspond to education level

- Does everybody have to take the same path?
- Design for varying skill levels and learning goals

Navigation Mechanisms

- Paging mechanism
  - “Next”and “previous” buttons
- Menu
- Index
- Map
- Search
- Hypertext links
- Auto-scan mode
  - Automatic switch to “next” page
- Location indicator
- Bookmark

Menus

- Menu may be combined with
  - Table of contents
  - Progress indicators (checkmark completed lessons)
- Constantly displayed menu vs. menu-on-demand
  - Menu-on-demand saves space, but requires additional navigation
- Multi-level vs. expanding menu
  - Keep structure always clear
- Breadth vs. depth tradeoff
  - Never require more than 3 decisions (maximum depth 3)
  - Wide menus are generally better than deep ones
  - Ideally, breadth is limited to a maximum of 7
    - » Giving a maximum of 343 different topics
- Understandable menu titles
  - Speaking the language of learners, full title as “tooltip”

Navigational Guidelines (Clark/Mayer)

- Use hypertext links sparingly
  - Links are optional, often bypassed
  - Not suitable for path to essential skill building elements
    - » Empirical evidence exists (Neiderhauser et al 2000)
- Allow learners to control pacing
  - Affirmed by empirical study (Mayer, Chandler 2001)
- Use course maps
  - To provide an overview and orient learners
- Provide basic navigation on all screens
  - Next, previous, up (accessible also when scrolled down)
  - "fuel indicator" (e.g. "Slide 54 of 57")

Default Navigation Options

- Two navigational versions of the same lesson (Schnackenberg, Sullivan 2000)
  - Pressing "continue" *bypasses* practice section
  - Pressing "continue" *leads into* practice section
- Results:
  - "More practice" version:
    - » Nearly twice as many screens viewed (compared to "low practice")
    - » Significantly higher scores on final test

Individual Differences in Learner Control

- Lai 2001:
  - Three types of learner control:
    - » Automatic *(program control)*
    - » Step-by-step *(linear control)*
    - » Free navigation *(learner control)*
  - Test subjects with high mathematical skills:
    - » better in all conditions
  - Test subjects with low mathematical skills:
    - » performing worst under free navigation condition

Do Learners Make Good Instructional Decisions?

- Calibration
  - What one thinks about own knowledge vs. actual knowledge
  - BTW: What is the capital of Australia?
  - Calibration accuracy in general is poor
- Learning vs. learner ratings (Dixon 1990):
  - 1,400 employees taking part in classroom training
  - End-of-course rating: Amount learnt, enjoyment, instructor skill
  - Post test on actual learning
  - ***No*** correlation between ratings and actual learning!
- Learner preferences and practice level (Schnackenberg et al. 1998)
  - Learners had a choice between more or less practice
  - Some were taught according to preferences, some in mismatch
  - ***Regardless*** of preferences, high-practice groups perform better

Metacognition

- Metacognition: Awareness of how one's mind works
- High metacognition skills lead to high learning management skills.
- Poor metacognition skills:
  - High learner control leads to poor decisions!
- Adapt learner control to audience!

Test scores (Young, 1996)	Learner Controlled	Program Controlled
Low metacognitive skill	20%	79%
High metacognitive skill	60%	82%