Differences between digital learning and paper learning

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What changes with digital learning?

• Much harder for the designers
• The design of simplicity is not easy with new technologies
  – Only few functionalities
  – Simple structure
  – Being coherent in functionalities design and presentation
  – Text readability, screen design, codes, naming
  – Taking users into account
• Making the right choice for the learning goal
What is a document? A set of choices
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- Material
- Code
- Structure
- Paper
- Digital

- Words
- Pictures
- Analogic realism
- Sensory mode
- Audio
- Visual

- Signaling
- Boldface, underline
- Subheadings, new line
- Space

- Move
- Static
- Dynamic

- Discourse
- Narrative
- Dialogue
- Descriptive
- Explicative
- Argumentative

- Linear
- Non-linear
- Structure

- On line
- Off line
- Access
The choice of material

• Digital is harder for the readers
  – Visibility, but new devices
  – Readability, but new devices and new skills (designers and readers)

• Depending on task
  – Specific materials for specific tasks

What is a document? A set of choices

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The choice of structure

• Non-linear organization is more difficult for navigation and comprehension
• Hierarchical organization improves navigation and comprehension
• Linear organization decreases performances but seems efficient for first use

Amadieu, Tricot & Mariné, 2009
What is a document? A set of choices
The choice of discourse

• Familiarity with the type of discourse and semantic content are the best predictors of performance
  – For single document
  – For set of documents

• But processing multiple sources is very difficult

Rouet & Britt, 2011
Les anti-OGM passent à l'offensive dans le Sud-Ouest

Le Figaro

Cinq gardés à vue après une opération commando TF1

Nouvel Observateur - Bio Frais - TF1 - Actualités News Environnement

Fauçage d'un champ de maïs OGM: José Bové dépeuple des plantations "en dehors de tout cadre légal"

AP 31.07.06 11:02

PARIS (AP) - "Ces champs sont plantés en dehors de tout cadre français sur la dissémination des OGM en plein champ", a déclaré parole de la Confédération paysanne, pour justifier ...

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José Bové et F.Roux anti maïs OGM en Haute-Garonne.

Les faucheurs volontaires vers une nouvelle année : bras de fer à Saint-Hilaire, en Haute-Garonne.

Rédigé par drees ouzmahi le Lundi 31 Juillet 2006 - 11:34 modifié le Lundi 31 Juillet 2006 - 12:29

Une action non violente des faucheurs volontaires ce Dimanche mené par José Bové et François Roux était au programme.

Objectif : destruction 3.000 mètres carrés de mais génétiquement modifié.

17 dossiers d'essai en champ de plante génétiquement modifiée ont été autorisés cette année par le ministre de l'Agriculture Dominique Bussereau, après avis favorable de la Commission du génie biomoléculaire (CGB).

Click to launch the video

La première opération, menée par José Bové, a visé un champ de « maïs commercial OGM » sur la commune de Saint-Hilaire, à ...

José Bové s'adresse aux 200 faucheurs volontaires présents dimanche pour l'arrachage des plants de maïs génétiquement modifié en Haute-Garonne...
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The choice of move

- Animations < Static pictures for novices
- Except for gesture learning
- Animations > Static pictures for advanced learners

- Transient information effect

Singh, Marcus & Ayres, 2012
The 1821 Derby at Epsom

Géricault (1821)
Galloping horse (1878)
Galloping horse (1878)

Muybridge, 1878
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The choice of signaling

- The use of signaling help readers in their attempts to follow a document’s organization and to identify important text content

Lemarié, Lorch et al. 2008
Split attention effect

• Impossible to watch to two different ways at the same time
• Means to decrease the split attention effect
  – Integrating texts and pictures
  – Using sounds and speech

Sweller, Ayres & Kalyuga, 2011
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The choice of code

- Audio + Visual decreases the split attention effect
- Audio + Visual > Audio (but exceptions)
- Audio + Visual > Visual (but exceptions)
- Realism = adding details (most of the time not useful)
- 2D > 3D for novices

Mayer, 2009
What is a document? A set of choices
The choice of sensory mode

- Picture + spoken text > Picture + text reading
- Picture + spoken text > Picture + spoken text + text reading

- Modality effect
- Redundancy effect

Mayer, 2009
Cool moist air moves over a warmer surface and becomes heated.

As the air in this updraft cools, water vapor condenses into water droplets and forms a cloud.

Eventually, the water droplets and ice crystals become too large to be suspended by updrafts.

When downdrafts strike the ground, they spread out in all directions, producing the gusts of cool wind people feel just before the start of the rain.

The cloud’s top extends above the freezing level, so the upper portion of the cloud is composed of tiny ice crystals.

As raindrops and ice crystals fall through the cloud, they drag some of the air in the cloud downward, producing downdrafts.

Within the cloud, the rising and falling air currents cause electrical charges to build.

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The choice of access

• Online > Offline for feedback content
• Offline > Online for feedback availability and speed
New reading / learning tasks

• What young people perform information seeking tasks very often
• Young information seekers
  – formulate queries and navigate less
  – use pictures during different steps of the information seeking process
  – perform copy-and-paste for different purposes during their task

Boubée & Tricot, 2013
Conclusion
Paper

- Easier for reading
- No sound => Split attention effect
- No animation
- Longer for information seeking
Digital document

- Harder for reading
- Less split attention
- Animations, 3D => more realism BUT no positive effect on comprehension
- Faster for information seeking
- Online access
Thanks for your attention!

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