

Optimizing Knowledge Transfer between Geologists and Engineers: Infographics as Working Memory Boosters and Engagers for Learning*

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Introduction

Bridging the gap between engineers and geologists can be facilitated by using tools that can assist with cognitive tasks. In particular, infographics can be particularly useful.

Infographics can serve a unique purpose in an online course or training program in that they both engage learners and provide a very handy mnemonic which assists in the storing and retrieving of information.

Infographics are easily incorporated into courses, and can be deployed via social media and within learning management systems. Further, it is a simple process to store your infographic in a cloud-based repository such as SlideShare (slideshare.net) which allows links, embeds to an easily downloaded pdf, along with allowing you to share accompanying notes and information.

Link to audio of presentation:

<http://www.zenzebra.net/podcasts/infographics.mp3>

Examples of Integration of Geology and Engineering

Here are two examples which were used for the petroleum industry, where it is often challenging to communicate information cogently and without clutter.

Geology Teams Up with Engineering: Must Know Reservoir Realities

- Reservoir heterogeneity . . .
- Structure(faults/fractures) . . .
- Geochemistry of oil/fluids . . .
- Lithology/mineralogy . . .
- Reservoir drive . . .
- Proppant selection . . .
- Reservoir fluid behavior . . .
- Geosteering . . .

<http://www.slideshare.net/beyondutopia/geology-and-engineering-mustknow-realities-for-reservoir-development> (website accessed November 10, 2015).

<http://journal.tumblr.com/post/125941346804/geology-and-engineering-must-know-realities-for> (website accessed November 10, 2015).



Geology vs Engineering Reservoir Realities

Four Key Considerations for Optimizing Recoveries in Mature Fields

- Maintain reservoir drive
- Know the fluid pathways
- Understand the geology
- Identify the hazards

<http://www.slideshare.net/beyondutopia/four-key-considerations-for-mature-fields> (website accessed November 10, 2015).



Working Memory and Infographics

Baddeley and Hitch (1974) described the mechanism used by short-term memory as a process they denoted as “working memory.” In their view, working memory is a process driven by the “central executive” which collects, temporarily stores, and directs data to the cognitive subsystems of the a) visuo-spatial sketch pad, and the b) phonological loop.

As a highly visual artifact with engaging and unique organization of visual information, an infographic is an ideal tool for facilitating the smooth functioning of working memory.

The central executive can easily incorporate a well-designed infographic in the visuo-spatial sketch pad, which is, in essence, the inner eye. The visual spatial sketch pad not only functions in the retrieval process, it also is used in navigation – in locating spatially where information might be.

The central executive takes and replaces information in the visuo-spatial sketch pad, and then relates it to long-term memory. The central executive can move material back from long-term memory to working memory, so the infographic can be used not only to store new information, but as a memory-trigger to retrieve information from long-term memory.

Baddeley and Lieberman (1980) emphasized that the central executive also functions as a system to keep attentional processes engaged, and to continually organize and prioritize (McLeod, 2012). It can also relate processes together, so that a infographic that is primarily attached to the visuo-spatial sketch pad, also can be related to the phonological loop processes.

Guidelines for Developing Infographics for Working Memory

1. Keep your information tied to one or two categories
2. Use a clear color scheme
3. Avoid clutter
4. Maintain a minimal main message
5. Connect / refer to details (don't include all the details in the infographic)
6. Use colors, white space, lively design
7. Use phone, tablet, and laptop-friendly hosting / delivery
8. Make your infographic multi-purpose, reusable
9. Encourage sharing / comments / collaboration

Tools for Building Infographics

Infographics were originally designed almost exclusively by graphic designers, but now there are a number of free and premium services that provide cloud-based services that include professionally designed templates which utilize unique graphics, layouts, and fonts.

Examples include:

Canva (www.canva.com): Templates and unique fonts / images for infographics and presentations. Website accessed November 10, 2015.

Piktochart (www.piktochart.com): Templates, images for infographics, reports, presentations. Website accessed November 10, 2015.

PicMonkey (www.picmonkey.com): Photo-editing that also includes a number of unique fonts, images, and clip art, and easy creation of collages that can also be designed as infographics. Website accessed November 10, 2015.

Final Thoughts

Infographics can be very practical as well as engaging and fun. For example, if you save them as a pdf files and print them out, you may use the infographics as a point of departure for an impromptu mind map.

The key is to design with an eye to inspiring and triggering thoughts – about the present, past knowledge, and collaborations. Used well, infographics can be an effective tool for deep learning.

Selected References

Baddeley, A.D., and G. Hitch, 1974, Working memory, *in* G.H. Bower, editor, *The psychology of learning and motivation: Advances in research and theory*, v. VIII: New York, Academic Press, p. 47–89.

Baddeley, A.D., and K. Lieberman, 1980, Spatial working memory, *in* R. Nickerson, editor, *Attention and Performance*, v. VIII: Hillsdale, N.J., Lawrence Erlbaum Associates, p. 521-539.

McLeod, S.A., 2012, Working Memory: Simply Psychology. Please refer to <http://www.simplypsychology.org/saul-mcleod.html> for access to article. Website accessed November 10, 2015.