Visual Metaphor Enhanced Educational Game Design and Development

The use of visual metaphors to exchange knowledge has been associated with attention, memory, comprehension and improved audience engagement. It contributes to meaningful learning through activating prior knowledge in order to learn new knowledge. They are used in our everyday life ranging from the icons of the trash can on computer desktops to the traffic light colour coding system. We could be so immersed in visual metaphors that we might lose sight of their prevalence. This workshop will take the participants on a journey on how prevalent visual metaphors are and how these could be designed based on sound theoretical frameworks such as the Cognitive Load. The presenter will take the participants on an interactive discussion on visual metaphor design and the process of transforming the visual metaphor into an online educational game.

Figure 1: A Medical Visual Metaphor

Keywords: Online educational game development, Visual metaphor design and development

Metadata

Max number of participants:	50
Required technology	Power point, computer, projector
Room setup	Around the table discussion or in a lecture theatre
Extra material	Pen, note pad
Duration	Half a day

Visual Metaphor

The use of metaphor in education dates back to the times of Aristotle. For example, he explained the relationship between the heart and blood vessels to that of vases (marcos, 1997). Similarly, great thinkers and teachers such as Freud used the horse and the rider metaphor to teach the id and the ego interactions as the ego needs to control the id like a rider does to the horse (Freud & Strachey, 1971). While these were verbal metaphors, drawing them turns them into visual metaphors. A commonly used visual metaphor is the "tip of the iceberg" metaphor explaining the ratio of the explicit to the implicit knowledge.

Using visual metaphors for educational purposes improves audience engagement, attention, memory and comprehension (Hanson, 1993). Adequately designed visual metaphors enhance memorability and understandability. In addition, they have low to moderate levels of difficulty in comparison to mind maps (Eppler, 2006). They also assist learners to incorporate newly learnt material to prior knowledge (Eppler & al, 2004). This feature fits particularly well with educational principles which include activating previous

knowledge (Mace & Binyon, 2006). Given the Visio-spatial structure of the metaphorical components of visual metaphor, it allows optimal information organization (Read, Cesa, Jones, & Collins, 1990). However, designing effective visual metaphors should be done in light of robust educational theoretical frameworks.

Visual Metaphor Educational Theory Informed Design

This workshop will take you through visual metaphor design and development based on the Cognitive Load Theory (CLT). This theory acknowledges the limited capacity of the Working Memory (WM) in comparison to long term memory (LTM) and how further interference with WM limited resources might impair learning through increasing cognitive load or mental effort (Chandler & Sweller, 1991; Kirschner, 2002; Sweller, Merrienboer, & Paas, 1998) . Also, it appreciates the importance of WM as an encoding gateway for memory into the LTM but also acknowledges that its limited capacity of holding an average of seven items of content for a given point in time (Miller, 1956) . Others even suggest that Miller's magical number of seven is an over estimation of the WM capacity and that it might either four items (Cowan, 2001) or even two (Gobet & Clarkson, 2004). Therefore, CLT suggests a way of overcoming the WM limitations through reducing cognitive load through coding multiple items of information as one thus freeing other available cognitive resources to optimise learning (Chandler & Sweller, 1991; Sweller et al., 1998; Van Merriënboer & Sweller, 2010).

In this workshop, effective design and development of visual metaphors would be discussed. In addition, the process of delivering these in an online game medium speaking today's digital language. A number of visual metaphors will be shown and the audience will be encouraged to share some visual metaphors from their fields of expertise. Then, we will attempt to optimise the design process in light of the Cognitive Load Theory. Finally, we will demonstrate the medical online game and share thoughts and ideas around gaming. These would include some game design principles and the process of creating a game from scratch.

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