VISUAL DESIGN:
A FORM OF SCIENCE OR
ART FOR LEARNING IN THE DIGITAL AGE?

BY JORGE REYNA

Scientists tend to look at visual design and aesthetics as purely artistic and subjective; however, professionals from the creative industry, such as graphic designers, visual designers and digital media producers, are very aware that visuals have a profound effect when communicating with an audience.

Effective visual design triggers the emotions of users. Therefore, it is necessary to understand and apply design elements in the learning context, using pedagogies and instructional strategies in conjunction with principles of layout design, colour, typography and image use to enhance the learning experience.

Designing effective online learning is very little related to artistic flair and creativity. Contrary to what many learning professionals think, understanding these principles is not gained by simply creating digital media. They need to be formally taught.

HOW DOES THE BRAIN PROCESS VISUAL STIMULI?
Research in neuroscience, conducted by LeDoux in the late 1980s, found a group of neurons which mediate visual stimuli received from the eye, responding a few milliseconds before the brain interprets that stimuli. In other words, the response to visual stimuli is visceral and reflexive, suggesting that emotion can precede cognition.

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Several experiments conducted in web design have confirmed this fact. Participants in these studies were asked to identify websites as credible based on their layout, design and colour scheme (i.e. visual stimuli). The websites they judged credible were aesthetically appealing, but their content was not necessarily accurate. This was also reflected in web design usability tests, where users formed an opinion on the visual appeal of home pages after a very short exposure of only 50 milliseconds.

These findings can be related to work done by Richard Mayer in multimedia learning principles and by John Sweller in cognitive load theory, but can also be found as far back as Gestalt theory, which explains how humans perceive elements of a design using principles such as

similarity, proximity and continuity. Busy interfaces that are hard to navigate, with clashing colour schemes and too much text, may cause emotional cognitive overload (ECO), leading users to walk away without engaging with the content.

Marketing professionals take advantage of this knowledge by creating beautiful interfaces using principles of colour, shape, contrast, repetition, alignment, proximity and so on. Regrettably, this knowledge is in its early stages in online learning.

As Connie Malamed says in her book about visual design for learning, these principles have an impact on how people sense the information presented and that affects usability, accessibility and credibility. As learning professionals, we would like

our content to be beautiful, credible and engaging for our learners. Therefore, it is time to consider visual design and aesthetics in the development of online learning materials.

THE DIGITAL MEDIA PRINCIPLES FRAMEWORK

Taking a multidisciplinary approach – based on neuroscience, psychology, visual design and aesthetics, and multimedia learning – we put together the digital media principles framework shown below, a model that identifies the minimum requirements to communicate effectively using digital media. As new graduates now require competency communicating in the digital space, this framework has been taken up in science, education and marketing curricula in tertiary institutions in Australia and Europe.
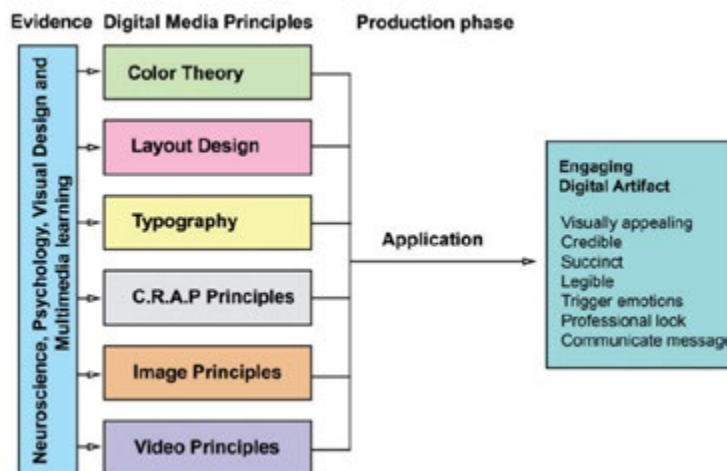
Colours create mood and it is essential to combine them effectively in online learning for maximum impact and also to avoid problems for colour-blind learners.

Layout design and distribution of elements within the screen can facilitate learning by reducing unnecessary cognitive load for learners engaging with the material.

Fonts or typography can make information stand out and avoid problems for learners with dyslexia.

Contrast, repetition, alignment and proximity (C.R.A.P) principles ensure that content is accessible to the eye and looks professional.

The use of images to complement text has been shown to have a positive effect on learning and recall.

Finally, **video production techniques** have a profound impact on learners' engagement with online material. It can create not only social presence, but also motivation for them to complete their tasks.

IMPLICATIONS FOR CONTENT DEVELOPMENT

Visual design and aesthetics in online learning are in the embryonic stage and, in many cases, not considered at all. Social platforms are changing the way people engage with content. For instance, the proliferation of high-quality advertising on Instagram (graphics, animations and videos) means learners are used to a high quality of content presentation.

Engaging new generations of learners will require speaking their language. Understanding the digital media principles and applying them in the development of online learning will increase learners' engagement with content.

Art, meaning design, aesthetic and digital media principles, can be evidence based. It can trigger reactions in the human brain and affect the learning experience, so yes, art is a form of science when it comes to visual design and aesthetics; the application of the principles discussed can determine responses in the brains of learners which cause them to engage — or not — with the content.

Proper implementation of these principles will benefit most learners, especially those with disabilities like colour-blindness or dyslexia. Therefore, as learning professionals, we all need to understand and apply these principles to enhance the learning experience.

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Jorge is a scholar of digital media for learning, with ten years of experience in university settings and fifteen years in the digital media industry. He has a strong focus on learning design which considers pedagogies, visual design, usability, accessibility, multimedia learning principles, presentation quality and the appropriate use of technology. Find out more at www.digitalmediaforlearning.com or contact via jorge.reyna@uts.edu.au

FURTHER READING AND RESOURCES

Applying the science of learning: evidence-based principles for the design of multimedia instruction (RE Mayer, 2008, The American Psychologist)

Attention web designers: You have 50 milliseconds to make a good first impression! Lindgaard G, Fernandes G, Dudek C et al. (2006). Behaviour & Information Technology 25: 115–126.

Cognitive Architecture and Instructional Design (John Sweller, Jeroen van Merrienboer & Fred Paas, 1998, Educational Psychology Review)

Cognitive-Emotional Interactions in the Brain (Joseph E. Ledoux, 1989, Cognition and Emotion Vol. 3)

Growing Pains with Information Overload (A. Rutkowski & Carol Saunders, 2010, IEEE Computer Society)

Introduction to Digital Media (Alessandro Delfanti & Adam Arvidsson, 2019, Wiley-Blackwell)

Learner Experience and Usability in Online Education (Imed Bouchrika, Nouzha Harrati & Phu Vu, 2018, IGI Global)

Principles of Gestalt Psychology (Kurt Koffka, 2013, Routledge)

The internet explosion, digital media principles and implications to communicate effectively in the digital space (Jorge Reyna, Jose Hanham & Peter Meier, 2018, E-Learning and Digital Media)

The Non-Designer's Design Book: Design and Typographic Principles for the Visual Novice (Robin Williams, 2014, Pearson Education)

Visual Design Solutions: Principles and Creative Inspiration for Learning Professionals (Connie Malamed, 2015, John Wiley & Sons)