



## From Principles to Production: How Visual Design Shapes Understanding

Ágota Végső 1, Paulo Nuno Vicente 1, Ana Figueiras 2

1. ICNOVA, NOVA FCSH University of Lisbon, Lisbon, PT

2. CICANT, Lusófona University, Lisbon, PT

Animation is one of the most popular audio-visual educational tools, with a growing audience, thanks to accessible technological innovations and the changing digital media consumption habits of young audiences. In response to the continued rapid development of the digital industry and the increasing reliance of young generations on online information and artificial intelligence, this article focuses on enhancing learning from Science Animation through academic and industry collaboration and bridging the culture of art and science by translating the principles for first-time science animation collaborators. To address the communication gap between scientists and visual storytellers, a literature search was conducted on science animation, encompassing overviews, reviews, and meta-analyses, which established guiding steps for creating accurate and compelling science visualizations. Drawing on Communication Models, Communication Design principles, Cognitive Theory of Multimedia Learning definitions and Social Semiotics, four initial key stages were identified: (1) Project Identification, the extraction and framing of the scientific core to be visualized, (2) Project Description, guiding the visual articulation of scientific content, (3) Animation Design, wherein animation history and animation-related multimedia learning principles inform the fundamental design rules of the concept art of animation, and (4) Animation Analysis, where systematic characterization complimented with social semiotic approach is compared to industry based animation analysis. Stages represent different complexities of talking, discussing, understanding, and analyzing science animation to support effective interdisciplinary collaboration.

**animation, communication design, interdisciplinary collaboration, multimedia learning, science visualisation**