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MULTIMEDIA EDUCATIONAL RESOURCE DESIGN FOR VISUAL EVIDENCE: A COMPARATIVE CASE STUDY OF INTERFACE MECHANISMS

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This paper explores how multimedia design transforms learning content into visual evidence through interface interaction. Based on a comparative case study of three media generations, the research analyses hierarchy, modular composition, and feedback readability. The findings identify three transferable interface mechanisms—stable structures, readable transitions, and coherent cues—that sustain a unified learning experience. The study synthesises these results into a coding matrix for educational resource design.

Key words: *multimedia educational resource design; visual evidence; visual communication design; interface interaction design; affective interface cues; comparative case study.*

INTRODUCTION

Multimedia educational resources are increasingly shaped by artificial intelligence and platform algorithms [1]. While AI-supported production accelerates media development, it often pushes learning content into standardized, data-like interface templates. Consequently, design becomes more critical as learners rely on clear visual logic and stable interface language to maintain attention and aesthetic comfort [2].

From a visual communication and interaction perspective, the priority is not adding more media but shaping readable cues that keep learning coherent. Unstable hierarchies and weak navigation signals lead to learning fragmentation. This paper examines "visual evidence" as a design outcome where composition and feedback make knowledge intelligible through visual form. A comparative case study of three media generations—Reader Rabbit (1984), Scratch (2007), and Google Arts & Culture (2011–present)—enables cross-case pattern building. Task-oriented interaction remains a fundamental logic in these interfaces, directly influencing learning outcomes [3].

PURPOSE

This study aims to advance a design-theoretical understanding of multimedia educational resources by positioning "visual evidence" as a core outcome of visual communication and interface interaction.



RESULTS AND DISCUSSION

Following established comparative case study procedures, each case was examined through contextual description, mapping of visual communication structure (layout, hierarchy, typographic and pictorial cues), and interface interaction reading (affordances, transitions, and feedback), then summarised in a compact coding matrix to extract cross-case design patterns. Visual interpretation focused on how composition and interface cues construct meaning and guide understanding, rather than treating style as surface decoration [2].

1. Scene-based visual metaphor as a “readable stage” (Reader Rabbit). The interface builds a stable scene composition with clear object placement and local animation cues, creating a readable “stage” for task-based learning [3]. Fig. 1 highlights how a consistent scene frame supports visual explanation: the character–object–action relationship is shown through spatial arrangement, and changes remain local and legible, protecting visual flow while guiding attention.

2. A modular interface grammar for learning-by-making (Scratch). Scratch presents a highly legible interface structure, separating the blocks palette, scripts area, and stage into stable zones. Fig. 2 shows how block shape, colour, and snap-to-fit behaviour form a consistent visual language. Visual evidence is generated through a direct “compose–run–see” loop: learners build visible structures, immediately observe outcomes on the stage, and refine actions through readable on-screen feedback. This turns abstract logic into visual form through interface clarity rather than text-heavy explanation.

3. Platform-based visual storytelling with coherent experience cues (Google Arts & Culture). The platform integrates high-quality cultural imagery with consistent layouts, card-based browsing, and immersive viewing modes. Fig. 3 shows a steady interface language across content types: stable navigation placement, predictable overview-to-detail transitions, and coherent graphic cues that sustain orientation and visual rhythm. Here, visual evidence is strengthened by keeping the interface restrained and consistent, while letting scale, framing, and guided presentation foreground the cultural artefacts and spaces as the main carriers of meaning.

Across the three cases, the coding matrix points to three transferable interface mechanisms that repeatedly support visual evidence in learning experience design: stable modular composition (repeatable layout logic and clear grouping), explicit wayfinding cues (persistent labels, overview-to-detail transitions, and predictable navigation patterns), and readable feedback (clear action cues and immediate, understandable response) [4]. In this study, *visual evidence* refers to a design condition in which knowledge becomes intelligible through visual form—where emphasis, sequence, and relations are made perceptible by hierarchy, pacing, and interface cues, and where the experience remains coherent rather than visually fragmented. Taken together, the three mechanisms form a constrained yet expressive interface order: variation is deliberately controlled to protect clarity and aesthetic comfort, while visual relations are organised in a diagram-like manner to strengthen visual explanation under platform and algorithmic conditions.

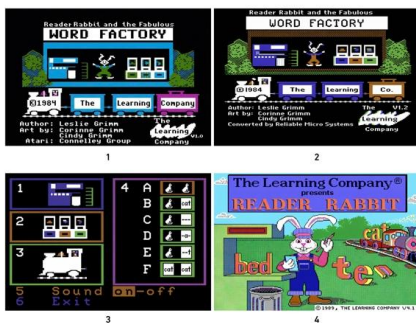


Fig.1. Reader Rabbit educational platform with “readable stage” feature

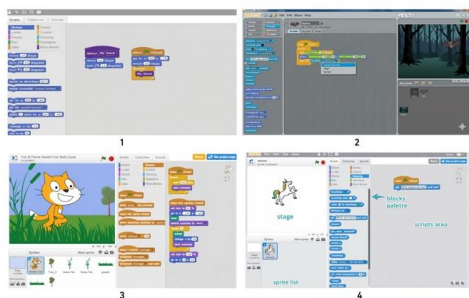


Fig.2. Scratch design with modular interface featuring learning-by-making

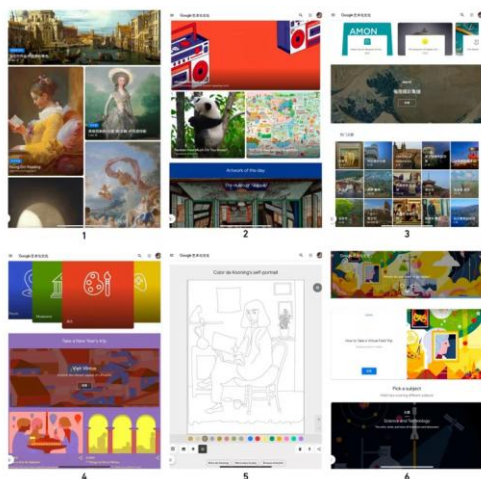


Fig.3. Google Arts & Culture website page design based on platform-based visual storytelling



CONCLUSIONS

This study positions visual evidence as a design outcome in multimedia educational resources: knowledge becomes intelligible through visual form when hierarchy, pacing, and interface cues make emphasis, sequence, and relations perceptible while keeping the experience coherent. Through a comparative case study, it shows that effective learning interfaces rely on a constrained yet expressive order rather than media novelty. Three transferable mechanisms consistently support this order: stable modular composition, explicit wayfinding cues, and readable feedback. Together, the study offers a compact theoretical contribution to visual communication and interface interaction design in educational resources, clarifying how aesthetic comfort and functional clarity can be maintained under platform- and algorithm-driven conditions.

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ЧЖАН Жухе, БЕЗУГЛА Р.

ДИЗАЙН МУЛЬТИМЕДІЙНИХ ОСВІТНІХ РЕСУРСІВ ДЛЯ ВІЗУАЛЬНИХ ДОКАЗІВ: ПОРІВНЯЛЬНИЙ АНАЛІЗ ІНТЕРФЕЙСНИХ МЕХАНІЗМІВ

У статті досліджено, як дизайн мультимедійних освітніх ресурсів трансформує навчальний контент у візуальні докази через інтерфейсну взаємодію. На основі порівняльного аналізу трьох поколінь медіа досліджено ієрархію, модульну композицію та читабельність зворотного зв'язку. Результати визначають три універсальні інтерфейсні механізми — стабільні структури, зрозумілі переходи та когерентні підказки, що забезпечують цілісність навчального досвіду. Дослідження синтезує ці дані в кодувальну матрицю для проектування освітніх ресурсів.

Ключові слова: дизайн мультимедійних освітніх ресурсів, візуальні докази, дизайн візуальних комунікацій, взаємодія в інтерфейсі, порівняльне дослідження.