# AIGC Technology Enabling Innovative Approaches in Visual Design of Online Learning Resources

**Jia Wu\***

Yunnan Open University, Kunming 650500, Yunnan, China

*\*Author to whom correspondence should be addressed.*

**Abstract:** In the current trend of educational digitization, online learning platforms have proliferated, making the visual design of digital learning resources increasingly critical. However, existing visual designs for online learning resources face numerous challenges. The emergence of AIGC (Artificial Intelligence-Generated Content) technology offers innovative solutions to these issues. This paper explores the application of AIGC technology in enhancing the "new quality productive forces" of visual design for online learning resources. It emphasizes the need to balance technological innovation with humanistic care and highlights the importance of human intervention in the design process.

**Keywords:** AIGC; Online Learning; Digital Learning Resources; Visual Design; New Quality Productive Forces

## 1. Research background and core value

### 1.1. Research background and problem statement

With the advancement of educational informatization, online learning platforms have become essential for knowledge acquisition. The quality of visual design for digital learning resources directly impacts learners' experiences and outcomes. However, traditional design methods suffer from inefficiency and homogeneity. The design process is cumbersome, requiring significant time and effort, which slows resource updates [1]. Moreover, repetitive design styles and elements lack innovation, reducing learner engagement. Issues such as poor color schemes and layout inconsistencies further diminish learning motivation and participation.

### 1.2. AIGC technology empowering visual design

AIGC technology enhances the "new quality productive forces" in visual design for online learning resources:

    (1) Creative Generation: It transcends human cognitive limitations, drawing inspiration from vast datasets to generate novel designs that revitalize learning resources.

    (2) Efficiency Improvement: It rapidly processes data, automates draft generation, and significantly

shortens design cycles.

     (3) Personalized Adaptation: It tailors visual elements to learners' characteristics and needs, offering customized experiences.

## 2. Core logic of AIGC technology driving design paradigm shift

AIGC technology transforms design paradigms through its three-layer architecture—data learning, demand analysis, and dynamic optimization—combined with algorithms like GAN and NLP [2].

### 2.1. Data-driven aesthetic learning

AIGC learns aesthetic principles from massive design cases [3]. By analyzing diverse visual designs—covering color schemes, typography, and graphical compositions—it quantifies design elements into feature vectors (e.g., RGB values, font attributes). Statistical analysis reveals patterns, such as preferred color ratios for educational content or font styles suited to specific age groups.

### 2.2. Intelligent demand-mapping mechanism

AIGC translates user demands into design parameters. Using NLP, it decodes contextual, audience, and cultural elements:

     (1) Scenarios: Adapts designs to learning contexts.
     (2) Audiences: Adjusts for cognitive levels and preferences (e.g., children, professionals).
     (3) Cultural Elements: Modifies designs based on cultural interpretations of colors and symbols.

### 2.3. Dynamic optimization through human-machine collaboration

AIGC incorporates real-time user feedback to refine designs. Designers evaluate and adjust AI-generated drafts, ensuring quality and creativity. This closed-loop collaboration continuously optimizes outcomes [4].

## 3. Practical applications in educational scenarios

### 3.1. Automated courseware template generation

NLP parses course outlines, identifying themes, key points, and objectives [5]. Design rules (layout, colors, typography) are applied to generate templates, drastically improving efficiency and update speed [6].

### 3.2. Intelligent integration of cultural elements

Style transfer techniques deconstruct and reorganize traditional elements, fostering cultural resonance and learner engagement [7].

### 3.3. Personalized learning interfaces

Learner profiles—based on behavior, interests, and goals—drive dynamic interfaces. Adjustments include font size, color schemes, and information density [8].

### 3.4. Smart conversion of lesson plans to courseware

Teaching logic (objectives, methods) is mapped to visual hierarchies, highlighting key content for clarity [9].

## 3.5. Automated video resource production

AI generates scripts, selects assets, and synthesizes videos. While limited in complex scenarios, it excels in standardized tasks [10].

# 4. Key challenges and strategies
## 4.1. Originality and copyright risks

AIGC may replicate existing designs. Solutions include:

(1) Blockchain-based traceability for ownership records.

(2) Copyright screening during data input [11].

## 4.2. Balancing emotional design

AIGC lacks emotional nuance. Adopt an "AI draft + human refinement" model:

(1) AI generates drafts rapidly.

(2) Designers enhance aesthetics and emotional resonance [12].

## 4.3. Multi-device adaptation

Device diversity (desktops, tablets, phones) poses challenges. Use parametric design systems to auto-adjust layouts.

# 5. Future trends and development paths
## 5.1. Immersive learning environments

AI-VR integration creates 3D learning spaces. Examples include virtual historical explorations and science labs [13].

## 5.2. Emotional design innovations

Biosensors (e.g., eye-tracking, heart-rate monitors) inform dynamic interface optimizations based on learner engagement [14].

## 5.3. Interdisciplinary collaboration

Collaborate with educators, psychologists, and AI engineers:

(1) Educators ensure pedagogical alignment.

(2) Psychologists address cognitive and emotional needs.

(3) Engineers optimize AIGC systems.

# 6. Conclusion: AIGC empowering new quality, productive forces

AIGC drives a triple leap in online learning:

(1) Efficiency Revolution: Accelerates courseware and video production.

(2) Experience Upgrade: Personalizes interfaces and integrates cultural elements.

(3) Educational Equity: Widens access to high-quality resources globally.

Balancing technology with humanistic care and leveraging human creativity ensures innovative, learner-centered designs [15].

## Disclosure statement

The author declares no conflict of interest.

## References

[1] Sun S, Luo L, Qiao X, 2024, New Momentum and Pathways for AIGC Empowering Innovative Design. Art and Design Research, 2024(2): 69–76.

[2] Zhu Z, Dai L, Hu J, 2023, High-Consciousness Generative Learning: Paradigm Innovation Empowered by AIGC Technology. e-Education Research, 44(6): 5–14.

[3] Tang N, Li T, 2024, Research on the Application of Visual Communication Design Empowered by AIGC. Screen Printing, 2024(19): 94–97.

[4] Liu J, 2024, Practical Research on Digital Teaching Reform of Visual Communication Design Empowered by AIGC. Art and Design (Theoretical Edition), 2024(8): 143–145.

[5] Liang X, Li W, Yue B, 2025, AIGC Technology Empowers the Modern Inheritance of Chinese Excellent Traditional Culture: Production, Dissemination, and Experience. Art and Design Research, 2025(1): 24–33.

[6] Ma K, Zhu L, Mao Y, 2025, Analysis of the Current State of Smart Reading Services on Academic Platforms and the Empowerment Path of AIGC Technology. Library and Information Service, 69(2): 45–55.

[7] Song Y, Luo J, 2024, Vision, Challenges, and Pathways of AIGC Empowering Digital Resource Services in Vocational Education. Chinese Vocational and Technical Education, 2024(17): 27–33.

[8] Liu J, 2024, AIGC Empowers Expression and Creation in Visual Communication Design in the "Intelligent+" Era. Shanghai Packaging, 2024(8): 32–34.

[9] Zhang T, 2024, Practice and Research on AIGC Technology Empowering Digital Media Art Creation, thesis, Shanghai Conservatory of Music.

[10] Xia B, 2012, Design and Implementation of a Teaching Website for Visual Communication Design Courses, thesis, Shandong University.

[11] Li X, 2025, Research on Visual Communication Design for Thematic Resource Websites, thesis, Nanjing Normal University.

[12] Liu J, Hao F, 2021, Research and Practice on Knowledge Visualization Representation of Online Open Course Resources. Journal of Hubei Correspondence University, 34(11): 138–140 + 143.

[13] Hardy G, 2014, The Beauty of LOGO: Creative Visual Logo Design. Posts & Telecom Press, Beijing.

[14] Liu Z, 2023, Research on the Influence of Visual Features of Learning Interfaces on Learning Emotions and Optimization Strategies, thesis, Qufu Normal University.

[15] Guan J, Guo Y, Wang F, 2017, Visual Spatial Bias of Mixed Text-Image Digital Resources and Its Impact on Learning Effectiveness. e-Education Research, 38(8): 89–95.