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Advancing Sustainable And User-Centered Design: The Role Of Digital Technologies In Visual Art Integration And Color Scheme Optimization For Community Buildings And Educational Centers

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Abstract: In this article, the role and importance of visual arts and colors in the artistic design of public buildings and educational centers is studied. The use of digital technologies and artificial intelligence is analyzed in the design of color types, taking into account the type of educational institution and the psychophysiological abilities of its students. The role of digital technologies in the design of visual arts and color solutions for public buildings and educational centers is analytically, theoretically and technically studied, and new solutions are given by the authors.
Keywords: "Artificial intelligence, digitization modeling, color solution, knowledge, skills, art, image"

Аннотация. В данной статье анализируется роль и значение художественного и цветового решения в процессе концептуализации общественных зданий и образовательных центров, с учетом психофизиологических возможностей обучающихся и типа учебного заведения. При разработке проектов в области художественного оформления и цветового решения для общественных зданий и учебных центров рассматривается использование цифровых технологий и искусственного интеллекта. В статье представлены новые подходы к рассмотрению роли цифровых технологий и искусственного интеллекта в разработке художественных и цветовых концепций для общественных зданий и учебных центров, которые основаны на теоретических, технических и практических аспектах.
Ключевые слова. «Искусственный интеллект, цифровое моделирование, цветовое решение, знания, навыки, искусство, изображение»

Introduction

Color plays a crucial role in shaping human perception, emotions, and decision-making. In fields such as education, design, and digital creativity, the choice of colors is not only an artistic preference but also a factor that influences understanding, communication, and user experience. With the rapid development of artificial intelligence, color selection processes are increasingly being supported by advanced computational methods. Artificial intelligence can analyze large volumes of data, identify hidden patterns, and generate recommendations that reflect both aesthetic harmony and psychological impact.

Unlike traditional approaches, where color choice relies heavily on personal experience and intuition, AI systems offer objective, data-driven insights. By utilizing tools such as neural networks, pattern recognition algorithms, and adaptive learning models, artificial intelligence provides opportunities to optimize color usage in teaching materials, user interfaces, and creative industries. This integration bridges art and technology, offering new perspectives for innovation in visual communication.

Public buildings and modern private educational centers are hubs focused on enhancing technologies and exploring innovations. These centers utilize the latest scientific and practical methods, implement interactive teaching approaches, provide online learning opportunities, and offer students access to cutting-edge technologies. Modern private educational centers should possess specific characteristics to ensure optimal usability. Designing these buildings according to building codes and safety standards (QMQ, SHQN) is a critical factor in creating a comfortable environment for both educators and learners.

In a digitalizing world, humanity increasingly delegates core tasks to digital technologies and artificial intelligence (AI). Digital technologies and AI have the capability to recommend appropriate color schemes and visual designs for buildings based on the provided data. The psychological impact of colors on human mental states has been scientifically proven. Therefore, when designing educational buildings and centers, it is essential to select colors that positively influence the creativity, mental state, and information processing abilities of both learners and educators.

Research Methods.

The study employed various methods, including analysis of scientific and educational-methodical literature, pedagogical observation, comparative analysis, generalization, as well as programming and digital modeling approaches.

Literature Analysis

When selecting a color palette for the environment, considering the specific age group of students is critical. Frank X. Mahnke, in his work *Color, Environment, and Human Response*, provides guidelines for adapting the educational environment's color schemes according to age groups.

Research Results and Discussion

In public buildings and educational centers, visual arts and color choices are crucial for influencing the moral, psychological, and physical well-being of students, teachers, and other participants. These choices help foster a positive social environment, support individual identity, and enhance the learning process.

The role of visual arts and color in public buildings and educational centers can be summarized as follows:

1. Creating a Moral Atmosphere: Colors, design, and decoration can enhance students' well-being and facilitate learning and creativity.
2. Demonstrating Themes: The visual presentation of a building, whether simple or complex, can support thematic representation, such as in arts, architecture, or events.
3. Psychological Impact: Textures and colors can influence students' psychological state. For instance, cool colors and unique patterns can reduce stress and enhance focus.
4. Aligning with Educational Methods: Building design should complement teaching methods, incorporating interactive screens, learning zones, and guidance areas to optimize the learning experience.
5. Consistency and Reputation: Visual arts enable students to express themselves and showcase knowledge, supporting both reputation and creative thinking.
6. Identity and Community Role: Colors and design highlight the community aspect of the building, encouraging engagement and a sense of belonging among participants.

By carefully selecting visual art and colors, public buildings and educational centers can create a calm, engaging, and productive learning environment.

Implementation Strategies for Color Selection:

- Define Goals and Objectives: Understand the building's purpose to guide visual and color decisions.
- Engage with Students and Teachers: Consult with learners and educators to identify preferences and needs.
- Seek Professional Advice: Architects, designers, psychologists, and color experts can provide guidance to achieve optimal results.
- Gather Student Feedback: Use surveys or other feedback tools to incorporate students' perspectives.
- Conduct Dynamic Experiments: Test and evaluate different design and color options with participants.
- Consider Emerging Trends: Incorporate fashion, social, and technological trends in design and color selection.

Artificial Intelligence in Color Selection

AI can play a crucial role in selecting visual arts and colors in public buildings and educational centers through the following approaches:

1. Color Selection Algorithms: AI algorithms can automate and optimize color choices, coordinating interior and exterior design with student experience in mind.
2. Identifying Learner Preferences: AI can analyze student preferences and usage patterns, providing insights for tailored designs.
3. Evaluating Learning Outcomes: AI can assess learning results to understand motivation, engagement, and areas of strength.
4. Optimizing Building Design: AI can optimize architectural layouts, classroom arrangements, and traffic flow for better efficiency.
5. Utilizing Databases: AI can leverage design data, feedback, trends, and prior experiments to inform color and design decisions.

Using AI ensures that building design and color selection enhance learning experiences, increase efficiency, and create a high-quality educational environment.

Steps for Developing AI-Based Emotion-Oriented Color Systems:

1. Data Collection: Collect information about the emotional and experiential responses of students, teachers, and other participants in the building.
2. Emotion and Attitude Analysis: AI analyzes collected data to identify correlations between emotions, attitudes, and mental states.
3. Model Development: Using analyzed data, AI develops a color selection model tailored to participants' emotional and cognitive needs.
4. Testing and Evaluation: Test the model to evaluate its effectiveness on emotional responses and optimize color choices.
5. Implementation and Monitoring: Implement the model, continuously monitor emotional responses, and adjust to create an optimal learning environment aligned with educational goals.

Expert collaboration, including psychologists, designers, and AI specialists, is essential for successfully creating AI-assisted, emotion-oriented color selection systems. Practical implementation may also involve surveys and direct interaction with building users to validate collected data and refine AI models.

Conclusion

Artificial intelligence offers diverse approaches to color selection by combining knowledge from data-driven resources, computational analysis, and adaptive learning models. AI can draw from extensive databases that include cultural, historical, and

psychological insights, which enrich the understanding of color perception and its impact in design. In addition, algorithmic analysis allows AI to identify patterns, trends, and correlations that are not always obvious to the human eye, making the process of selecting effective color palettes more precise and reliable.

Machine learning techniques and neural networks further enhance this process by enabling systems to learn from the preferences and experiences of designers, educators, and users. These adaptive systems continuously refine their decision-making, ensuring that color choices are not only aesthetically pleasing but also contextually appropriate. Moreover, advanced recognition algorithms can establish meaningful relationships between colors, supporting the creation of balanced and innovative visual solutions.

Overall, the integration of artificial intelligence in color selection supports more accurate, efficient, and creative outcomes. It provides designers and educators with powerful tools that combine analytical precision and artistic flexibility, ultimately contributing to the development of unique and impactful design practices.

Artificial intelligence (AI) can utilize various methods for color selection. These methods include leveraging databases contributed by students, teachers, and designers, performing algorithmic analyses, and employing integrated systems such as neural networks. The following key approaches illustrate how AI can support color selection:

1. Use of Databases: AI can access multiple databases, including information about countries, cultures, historical references, fashion trends, psychological influences, and more. These datasets provide comprehensive insights into factors affecting color selection and emerging design tendencies.
2. Algorithmic Analyses: Through statistical analysis, data evaluation, and other algorithmic techniques, AI can identify significant factors that influence color choices. This approach aids in empirical assessment and predictive analysis for selecting optimal colors.
3. Algorithms and Remote Recognition: AI can apply algorithmic and remote recognition techniques to assist in color selection. Remote recognition helps identify meaningful relationships between multiple colors and is crucial for optimizing color combinations in visual arts and design.
4. Learning Capabilities of Systems: Integrated systems such as neural networks and machine learning models are used in color selection within visual arts. These systems learn from and analyze data and experiences provided by students, teachers, and designers, enabling AI to make informed decisions.

In conclusion, AI supports precise color selection tailored to the needs of educators, students, and designers. It facilitates the study of critical algorithms and analyses, while also contributing to the creation of innovative and visually compelling designs.

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