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MULTIMEDIA TECHNOLOGIES AND INFORMATION DESIGN IN THE EDUCATIONAL PROCESS: ADVANTAGES AND DISADVANTAGES

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The paper analyzes the combination of multimedia technologies and information design tools in the educational process. The research is based on the principles of multimedia learning proposed by Richard Mayer. The study results prove that visualizing educational material based on the "Principles of Multimedia Learning" can help students better understand and remember information, and understanding the design capabilities of multimedia educational resources can improve the level of education.

Key words: *multimedia technologies, graphic design, information design, Chinese art and culture, educational resources*

INTRODUCTION

With the rapid development of information technology and the internet, knowledge visualization design has become a key tool in digital culture and multimedia education. However, existing knowledge visualization designs still face several challenges: most designs rely solely on one sense (such as vision), neglecting the integration of auditory and tactile senses; the role of emotions and expression in information memory has not been sufficiently studied. In addition, the patterns in ancient books contain complex and difficult-to-understand cultural symbols, and their way of knowledge expression differs from modern reception habits. Therefore, this current study stage will use Richard Mayer's "Multimedia Learning Principles" in combination with information visualization design to construct the "CAME" knowledge visualization framework, which aims to help learners better understand cultural knowledge and promote innovation in multimedia educational resource design.

PURPOSE

This study aims to examine the potential benefits and challenges of using multimedia technologies and information design in the educational process. By examining the effectiveness of different approaches, the study aims to identify how to increase the effectiveness of disseminating cultural knowledge and improve the preservation of cultural memory through multimedia technologies and information design.

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RESULTS AND DISCUSSION

The primary present results of this study are that the "CAME" visualization design framework represents an innovative approach developed from Richard Mayer's Multimedia Learning Principles, aimed at addressing the design challenges of effectively communicating complex and hard-to-understand knowledge in educational contexts.

The process of applying this framework to the visualization of <The New Diagram of Confucian Imagery> involves several key steps:

1) Database Creation. The patterns related to astronomical instruments mentioned in the text were extracted. A combination of expert interviews and questionnaires was used for a comprehensive quantitative analysis, resulting in the collection of 19 representative patterns to form the database for the visualization design（Fig.1.）.

Fig.1. Statistics of the patterns in <The New Diagram of Confucian Imagery>.

2) Classification by meaning. nature, cultural symbols, abstract geometry. Perform semantic analysis to extract keywords [2].

3) Shape grammar application. Redesign symbols through operations such as rotation, translation, and mirroring.

4) Pattern visualization. The newly designed graphics are visually designed with the patterns of <The New Diagram of Confucian Imagery> for efficient dissemination [3].

After the research on the information visualization framework of "CAME" in specific design practice, this study discusses the 4 core concepts of the framework as follows.

1) Consistency and Distinction. Visual designs such as graphics and symbols all follow the principle of "Consistency and Distinction". Ensure strong consistency in visual language. Provide high-style visual language for the educational dissemination of knowledge. [4].

2) Adaptability. This principle is crucial to the localization of symbols and contextual design. The target audience for disseminating knowledge of ancient culture is mainly college students, so the design focuses on youthful aesthetics, incorporates abstract elements. By separating information levels and highlighting key information, the design enhances the readability of the information.

3) Multisensory Integration. This principle meets the need for richer and more immersive sensory experiences in knowledge education and communication.

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Techniques such as different thicknesses of lines, color contrasts and compositional arrangements are used to create a visual experience. Break down the content of ancient texts into multiple dimensions (e.g., time, space) and use innovative graphics to help learners understand the hierarchy of information. Incorporate synchronized audio narration to enhance the transmission of complex ancient texts from the auditory channel.

4) **Emotional engagement.** This principle plays an important role when visualizing complex or unfamiliar educational knowledge. Transforming texts and themes through emotional associations simplifies obscure information into a metaphorical visual language. On the other hand, by incorporating traditional elements such as Chinese patterns, vertical text, and symmetrical layouts, the cultural value of the original content is preserved and emotional resonance is added to the design. In addition, methods such as repetition and emphasizing the spatial hierarchy of information help to consolidate the content in the user's mind and create lasting memory anchors.

This design approach ensures ancient book serves not only as a tool for information dissemination but also as a bridge that connects ancient cultural heritage with contemporary readers, fostering both emotional and cognitive engagement.
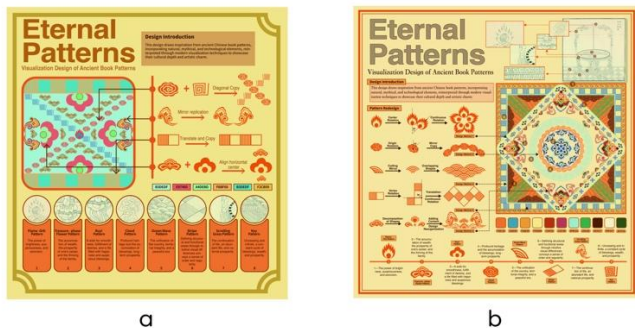

Fig.2. «The New Diagram of Confucian Imagery» Ancient Book Pattern Innovation and Visualization Design: a - Initial Draft; b - Based on "CAME" Framework

Fig.2. a shows the initial draft of the innovative pattern and knowledge information visualization design for the ancient book *«The New Diagram of Confucian Imagery»*. Fig.1. b shows the information visualization design based on the rules mentioned in the framework of "CAME." It can be seen that the "CAME" framework reflects better visual presentation results in terms of pattern innovation, information hierarchy construction, information expression style, layout, fonts, colors, and other visual design levels.

CONCLUSIONS

This study introduces the "CAME" framework for knowledge visualization, developed based on Richard Mayer's "Multimedia Learning Principles," and applies

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it to the visualization of pattern knowledge in ancient text. By establishing the "CAME" framework, which integrates principles of "Consistency and Distinction," "Adaptability," "Multisensory Integration," and "Emotional Engagement." The framework has been derived from a synthesis of various principles in "Multimedia Learning Principles," including "Multimedia," "Coherence," "Temporal Contiguity," "Spatial Contiguity, "and "Personalization" principles. The study has reached a stage where initial findings have been gathered.

Implementing this framework in the study provides an innovative approach to knowledge transmission, bridging the gap between the rich heritage of ancient wisdom and modern learners. Combining visual and auditory elements with a focus on emotional engagement fosters a deeper and more adequate understanding of cultural knowledge, promoting a more profound educational experience through multimedia resources.

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ЧЖАН Жухе, БЕЗУГЛА Р.
МУЛЬТИМЕДІЙНІ ТЕХНОЛОГІЇ ТА ІНФОРМАЦІЙНИЙ ДИЗАЙН В ОСВІТНЬОМУ ПРОЦЕСІ: ПЕРЕВАГИ ТА НЕДОЛІКИ
У роботі проведено аналіз поєднання мультимедійних технологій та інструментів інформаційного дизайну в освітньому процесі. В основу дослідження покладені принципи мультимедійного навчання запропоновані Річардом Майєром. Результати дослідження доводять, що візуалізація навчального матеріалу на основі «Принципів мультимедійного навчання» може допомогти учням краще розуміти та запам'ятовувати інформацію, а розуміння можливостей дизайну мультимедійних освітніх ресурсів покращити рівень освіти.
Ключові слова: мультимедійні технології, графічний дизайн, інформаційний дизайн, мистецтво і культура Китаю, освітні ресурси.