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Article

Applied the Chinese Paper Cutting Teaching Guideline in Modern Multimedia Technology for Primary School Art Courses

Qimeng He [1], Manus Keawbucha [1] and Nut Chiangthong [1,*]

[1] Chakrabongse Bhuvanarth International College of Interdisciplinary Studies, Rajamangala University of Technology Tawan-ok, Bangkok, Thailand

* Correspondence: Nut Chiangthong, Chakrabongse Bhuvanarth International College of Interdisciplinary Studies, Rajamangala University of Technology Tawan-ok, Bangkok, Thailand

Abstract: This study explores integrating Chinese paper-cutting with modern multimedia technology (AI, AR, VR) in primary art education, aiming to build a teaching guide that balances cultural heritage with technological empowerment. Using a "culture-technology-education" framework, the research employed literature analysis, expert interviews, surveys, teaching experiments, and IOC evaluations. Interviews clarified the educational logic of AI, AR, and VR, identifying a "digital design + manual implementation" path. Surveys revealed key needs like resource scarcity and student preference for cooperative learning. Based on these findings, a progressive 12-lesson, six-module course was developed. A 4-hour teaching experiment with fifth graders in Guangzhou showed significant improvements in pattern understanding, technical skills, learning interest, and cultural identity. The resulting guide and resource package offer practical, ready-to-use support for teachers. The study concludes that merging paper-cutting with multimedia technology effectively stimulates artistic interest and cultural identity while fostering innovative thinking. It holds strong theoretical and practical value, suggesting future work should expand trials and explore emerging technologies to build a broader digital education ecosystem for intangible cultural heritage.

Keywords: Chinese paper cutting; modern multimedia technology; art education in primary schools

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1. Introduction

In today's society, art education plays a crucial role in cultural inheritance and innovation, helping children cultivate aesthetic awareness and inner harmony. In China, traditional intangible cultural heritage has been increasingly integrated into classroom teaching, with more than 2,000 schools selected for heritage programs involving folk art and handicrafts [1].

At the same time, the emergence of Education 4.0, driven by digital and artificial intelligence technologies, is reshaping educational systems and providing new opportunities for the modernization of traditional art education [2]. Chinese paper-cutting, as a folk art with a broad grassroots foundation, has been introduced into many primary schools; however, it is still mostly offered as informal interest-based activities rather than as formal courses integrated with modern technology.

Several challenges remain. Student engagement is declining due to limited interactivity in traditional teaching approaches, particularly those reliant on aging

inheritors. In addition, teacher-centered instructional models restrict students' creative development, while many educators experience technological anxiety when attempting to incorporate digital tools into teaching. Studies indicate that a significant proportion of primary school art teachers struggle to keep pace with rapid technological advancements, and the adoption and integration rates of emerging technologies such as AR and VR remain relatively low [3, 4].

Meanwhile, evidence from neuroscience suggests that artistic practice enhances neural plasticity and creative thinking. In particular, paper-cutting activities uniquely stimulate spatial reasoning, as they require continuous mental visualization throughout the cutting process [5, 6].

Based on this context, this study integrates Chinese paper-cutting with modern multimedia technology in primary school art education, aiming to construct a "multimedia + paper-cutting" curriculum model. It seeks to provide practical teaching references for educators while enhancing students' artistic literacy, aesthetic competence, and emotional expression.

2. Research Objectives and Methodology

2.1. Objectives

To study and analyze the application of Chinese paper cutting in modern multimedia technology-based teaching.

To develop Chinese paper cutting application with modern multimedia technology guideline for use in primary school art teaching.

2.2. Research Methodology

This study is grounded in a three-dimensional "culture-technology-education" framework and employs a mixed-methods approach combining literature analysis, expert interviews, and questionnaire surveys. The research was conducted in four stages: first, a literature review to establish the theoretical foundation and assess the current research landscape; second, semi-structured interviews and questionnaire surveys with teachers and students to gather diverse perspectives and identify practical needs; third, the design of a comprehensive teaching guide comprising 12 lessons; and finally, validation and refinement of the guide through IOC expert validity evaluation and teaching practice.

The purpose of this research is to design a systematic and progressive curriculum for primary school teachers that integrates Chinese Paper Cuttings and modern multimedia technologies (such as AI, VR, AR), so as to cultivate students' basic Paper Cuttings skills and their ability to apply emerging technologies. The research first systematically combs the main types of Paper Cuttings in China and modern multimedia technology suitable for primary school teaching, combines students' cognitive development characteristics and learning needs, and selects the content and form suitable for classroom teaching.

The curriculum design closely follows the cognitive development stage of primary school students, and the difficulty gradually increases. At least one technological tool is integrated into the teaching design of each lesson, and it runs through teaching stages such as introduction, explanation, demonstration, practice, and presentation, ensuring a deep integration of technology and teaching content. Based on the theories of intangible cultural heritage education, educational informatization, and cognitive development, the research aims to ensure that the curriculum is academically rigorous, content is tailored to students' age characteristics, and practical in classroom teaching.

Research Area: Primary school in Guangzhou, China.

Key Informant: This study selected three key experts for semi-structured interviews and conducted a questionnaire survey of teachers and students in a primary school in Guangzhou, which provided important support for the research.

1) Rao Baolian, a renowned contemporary Paper Cuttings artist in China and a representative inheritor of the national-level intangible cultural heritage (Guangdong Paper Cuttings).
2) Qiu Nianghui, an information technology teacher, a senior primary school teacher, and an expert in multimedia educational technology. He has been teaching for 28 years.
3) Huang Yingxi, a primary school art teacher. She with 15 years of teaching experience, she has previously worked in art therapy education.

Survey Subjects: 20 teachers from different subjects and 40 students from grade five in a primary school in Guangzhou.

2.3. Data Collection Tools

(1) Interview Form: Based on the three-dimensional research framework of "culture-technology-education", semi-structured interviews were conducted focusing on the cultural value of Chinese Paper Cuttings, modern multimedia technologies suitable for the classroom, classroom practices, and integration guidelines.

(2) Questionnaire Survey: Teacher questionnaire included basic information, use of modern multimedia technology in teaching, preferences, and challenges. Student questionnaire focused on preferences regarding classroom activities, paper-cutting types, and multimedia technology combinations.

(3) IOC Index Score form : Three evaluation experts used the Item-Objective Consistency (IOC) index scoring scale to evaluate the expert interview form, teacher questionnaire, and student questionnaire.

2.4. Data Collection

The study followed these steps: Literature Research, Designing Forms, Interview into Key Informant, Questionnaire Survey, Data Analysis, Instructional Design, Summarize Experience, and IOC Evaluation Summary. The IOC scores for expert interviews (0.96), teacher questionnaire (0.96), and student questionnaire (1.0) indicated high validity.

2.5. Data Analysis

Qualitative data from expert interviews were transcribed and analyzed using thematic coding with NVivo software to identify recurring themes and key concepts. Quantitative data from teacher and student questionnaires were analyzed using SPSS for descriptive and cross-tabulation statistics.

3. Results

3.1. Result of Study and Analyze the Application of Chinese Paper Cutting in Modern Multimedia Technology-based Teaching

3.1.1. Chinese Paper Cutting

This study systematically categorizes Chinese paper-cutting from seven perspectives—color, tools, technique, usage, theme, symbols, and folding methods—highlighting its rich diversity in forms such as monochrome, colorful, and three-dimensional works, techniques like intaglio and relief carving, and its wide range of applications from decoration to religious expression, see Table 1.

Table 1. Type of Chinese Paper Cutting.

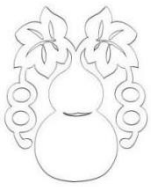
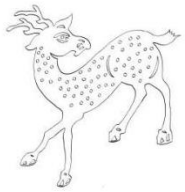
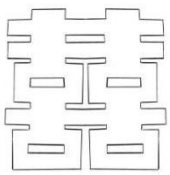
Type	Classification

By Colour	Monochrome Paper-Cutting
	Three-Dimensional Paper-Cutting
	Colourful Paper-Cutting
By Tools	Scissors
	Carving Knife
	Hand-Torn Paper-Cutting
	Scalded Paper-Cutting
By Technique	Copper Chisel Paper-Cutting
	Intaglio
	Relief Carving
	Yin-Yang Combination
By Usage	Decorative Items For Beautification
	Auspicious Decorations
	Religious
By Theme	Folk Custom
	Traditional Opera
	Religion And Sacrifice
	Natural Scenery
	Good Luck
By Symbol	Basic Symbol
	Geometric Pattern
	Plant Patterns
	Character Pattern
By Folding Methods	Parallel Folding Method
	Free Folding
	Flowery Paper-Cutting

The research further reveals that paper-cutting is deeply intertwined with traditional Chinese culture, centering on the five auspicious themes of "Fu, Lu, Shou, Xi, Cai" (Blessing, Prosperity, Longevity, Happiness, and Wealth), thereby embodying the Chinese nation's enduring hopes and beautiful wishes for life.

For example, "Fu" is often symbolized by bats and gourds, "Shou" is presented by immortals and cranes, and "Xi" is expressed by double happiness and mandarin ducks. These symbol patterns are not only decorative elements, but also a visual condensation of cultural meanings and folk wisdom, see Table 2.

Table 2. Paper Cuttings with five auspicious themes of "happiness, wealth, longevity, happiness and wealth".

Fu Blessing	Lu Prosperity	Shou Longevity	Xi Happiness	Cai Wealth
				

3.1.2. Modern Multimedia Technology Selection

In this study, modern multimedia and AI technology, as "creative tools" rather than "alternative molds", were systematically integrated into the art Paper Cuttings teaching in primary schools, forming a dual track teaching model of "digital design+manual practice". According to the teaching adaptability, three types of AI tools have been selected and

applied: AI drawing tools (such as DouBao and Dreamina) support students to generate Paper Cuttings patterns through text instructions to stimulate creative inspiration, and about 85% of students can accurately complete pattern design; AI animation generation tools (such as Dreamina) transform static Paper Cuttings into dynamic narrative short films to help students understand animation principles; AI assisted design tools (such as DouBao cutout) provide material preparation for AR stereoscopic display and VR exhibition, achieving seamless integration between digital design and physical cutting.

In addition to artificial intelligence, the research also integrates augmented reality (AR) technology (such as Paper Cuttings flowers, KIVICUBE) to project the plane Paper Cuttings virtual to the real scene or create three-dimensional effects, significantly improving the interest of the classroom; Virtual reality (VR) technology (such as Yuanmei Business Card) supports students to create a virtual Paper Cuttings museum and expand the exhibition dimension of works; Interactive teaching platforms, such as the Seewo whiteboard, enhance classroom interactivity through gamified learning. These technologies together create an immersive and interactive digital teaching environment.This teaching guide follows the principle of "transmitting art first, then transmitting technology", and constructs a teaching loop of "cultural introduction - digital design - manual practice - immersive display". Students first use AI to generate creative patterns, then personally cut and carve them into physical objects, and finally showcase and share them through AR/VR. This path not only retains the essence of "hand and brain" of Paper Cuttings art, but also realizes the activation of intangible cultural heritage through technology empowerment, so that students can cultivate digital literacy and innovative thinking while inheriting culture, and realize the deep integration of traditional art and modern technology.

3.1.3. Expert Interview Analysis

This study designed 8 semi-structured interview questions around the four dimensions of "culture technology education integration guidelines". The cultural dimension focuses on the core value and inheritance dilemma of Paper Cuttings art, the technical dimension discusses the adaptability and application cases of multimedia tools, the educational dimension diagnoses students' learning difficulties and technical intervention points, and the integration guide dimension collects experts' suggestions on key elements of the teaching guide. The interview aims to clarify the degree of technological integration and teaching logic from the perspective of cross disciplinary experts, providing theoretical and practical support for subsequent course design.

The three experts overall hold a positive and supportive attitude. The inheritors of intangible cultural heritage emphasize the cultural essence of Paper Cuttings, and advocate that multimedia should be used as a "cultural interpretation tool" rather than a "substitute"; Information technology teachers actively respond to technology and propose a fusion path of "digital design+manual implementation"; Primary school art teachers focus on teaching effectiveness, affirm the value of technology but are afraid of students' excessive dependence. Despite different perspectives, the three experts reached a high consensus: technology should be positioned as a "tool that inspires creativity", following the core principle of "technology empowerment rather than substitution", and ensuring equal emphasis on cultural heritage and technological innovation.

The interview clarified the teaching adaptation paths of AI, AR, and VR technologies: AI tools are suitable for pattern generation and creative inspiration, AR technology enhances virtual real interaction and display experience, and VR supports virtual exhibition and spatial construction. At the same time, experts pointed out the learning difficulties of students in understanding patterns, using tools, drawing inspiration for

composition, and associating cultural meanings. They also proposed that multimedia technology can be accurately involved through dynamic decomposition of graphics, virtual simulation software, AI assisted generation, interactive story animation, and other methods to break through the bottleneck of traditional teaching.

Expert interviews have contributed key results to this study: firstly, the integration path of "digital design+manual practice" has been established; The second is to propose specific suggestions such as designing differentiated technology interventions according to the learning stage and developing systematic teaching resource packages. These achievements have been fully incorporated into the 12 hour teaching guide, with a total of 96 qualitative analysis interviews and 136 reference points extracted, providing a solid empirical basis for constructing a "culture technology education" integrated teaching framework.

Thematic coding of three expert interviews (total 96 codes, 123 reference points) revealed key consensus across four dimensions, see Table 3.

Table 3. Topic code for three expert interviews.

No.	Dimension	Key Findings	Word Frequency Highlights
1	Culture	Core Cultural Values Include National Memory, Emotion, Wisdom, and Life Aesthetics. Main Difficulties: Lack of Systematic Multimedia Resources, Technology Cannot Fully Replicate Tactile Craftsmanship.	Activity Experience (7), Cultural Values (6)
2	Technology	Recommended: Ai Tools (Low Threshold), Ar/Vr (Immersive Experience). Advantages: Intuitive, Interactive. Disadvantages: May Weaken Hands-On Willingness If Overused.	Ai-Related (7), Multimedia Technology (7), Digital Tools (6), Interactive Technology (6)
3	Education	Students Struggle With Pattern Comprehension, Tool Usage, and Cultural Association. Multimedia Can Provide Dynamic Decomposition Diagrams and Virtual Simulations.	Teaching Methods (8), Teaching Resources (8), Teaching Tools (7)
4	Integration	Best Approach: "Digital Design + Manual Implementation." Prioritize Teacher Training, Resource Development, and Differentiated Instruction.	Teaching Integration (6), Fusion Method (4)

Experts agreed on the core value of Paper Cuttings teaching for cultural inheritance, pointing out challenges in systematic resources, teachers' ability, and technology adaptation. The integration path of "digital design + manual practice" was emphasized.

3.1.4. Teacher Questionnaire Results (N=20)

A teacher survey shows that teachers urgently need to develop subject adapted courseware and lesson plan resources, as well as technical operation training, in order to achieve effective integration of intelligent and integrated multimedia teaching tools with traditional culture, see Table 4.

Table 4. Teacher questionnaire survey results.

Investigation Project	Key Data	Brief Analysis
Age Distribution	20-30 years old (55%) 31-40 years old (35%)	Middle aged and young teachers are the main ones. High acceptance of new technologies
Common Teaching Tools	Ppt+video "(25%) is the most common	Popularization of basic tools, young teachers try more diverse tools
Resource Difficulties	70% have no matching courseware 55% are technically unskilled	Resource adaptation and technical training are two major pain points
Core Requirements	85% require subject adaptation courseware and lesson plans	Resource development is the primary task
Technical Expectations	One click courseware tool is the most popular 40% prefer intelligent classroom systems	Looking forward to integrated and intelligent teaching support
Technical Preference	Ar/vr/ai teaching assistants are receiving attention Teachers tend to integrate multiple technologies	There is a clear demand for intelligent and composite tools

3.1.5. Student Questionnaire Results (N=40)

Students prefer the teaching form of team cooperation, game based learning and combination of reality and fiction. They look forward to combining VR/AR, AI design and other new technologies with Tuanhua Paper Cuttings to achieve a comprehensive learning experience that focuses on both fun, creativity and sociability while retaining manual operation, see Table 5.

Table 5. Student questionnaire survey results.

Investigation Project	Key Data	Brief Analysis
Favorite Classroom Format	Teamwork (42.5%) Scenario simulation (30%)	Preference for interactive and collaborative learning
Favorite Paper Cuttings Types	Tuanhua paper cuttings (40%) Symmetrical paper cuttings (37.5%)	Prefer visually appealing and easy-to-use forms
Expected Technological Integration	Vr/ar/real time animation/ai design (all>40%)	Looking forward to the combination of immersive experience and intelligent creation
Expected Features	Gamified learning (92.5%) Custom pattern (65%)	Emphasize fun, creativity, and sociality
Handmade Value Recognition	27.5% hope to retain traditional manual operation recognition	The learning mode of combining reality and virtuality

3.1.6. Application of chinese paper cutting in Modern lultimedia Technology-based Teaching

Based on the previous comprehensive analysis of the types of Paper Cuttings, multimedia technology, expert interviews and teacher and student questionnaires, this study identified the types of Paper Cuttings suitable for primary school art classes and the modern multimedia technology that should be prioritized.

In terms of the types of Paper Cuttings, the three types that students have the highest preference are Tuanhua Paper Cuttings (40.00%), symmetrical Paper Cuttings (37.50%) and continuous folding Paper Cuttings (20.00%). The above form has been determined to be the most suitable teaching method for primary school classrooms due to its folding rules, symmetrical composition, and moderate operational difficulty.

In terms of multimedia technology integration, this research selects three kinds of adaptive tools: AI generation tools (DouBao, Dreamina), AR display tools (Paper Cuttings flowers, KIVICUBE) and VR exhibition tools (Yuanmei Business Card), to build a teaching closed-loop of "cultural introduction digital design manual practice immersive display". The integration of technology follows the five principles of "teaching center, student centeredness, technology adaptation, fusion innovation, and implementation guidance", and adheres to the dual track creative path of "digital design+manual practice". It not only responds to the needs of 85% of teachers for subject adaptation resources, but also meets students' expectations for the combination of virtual and real learning and gamified learning, see Table 6.

Table 6. Paper Cuttings type and multimedia technology integration recommendation table.

Category	Recommended Content/Tools	Core Application
Paper Cuttings Type	Flowery Paper-Cutting , Symmetrical Fold, Continuous Folding Paper	Cuttings Folding Rules, Symmetrical Composition, Auspicious Symbolism, Suitable For Primary School Classrooms
AI	Doubao, Dreamina	Pattern Generation, Creative Inspiration, Animation Demonstration
AR	Paper-Cutting Flower , Kivicube,	Virtual Reality Interaction, Three-Dimensional Display, Simulated Paper Cuttings
VR	Yuanmei Business Card	Virtual Exhibition, Space Construction, And Artwork Display
Teaching Path	Cultural Introduction - Digital Design - Handicraft Practice - Immersive Display	Dual Track Parallel Of Digital Design And Manual Practice

3.2. Result of Develop Chinese Paper Cutting Application with Modern Multimedia Technology Guideline

In order to realize the deep integration of traditional paper-cutting art and modern multimedia technology, this study, based on the expert guidance and the research of teachers and students, selects the appropriate multimedia software and paper-cutting teaching content, and organically integrates and systematically integrates into the paper-cutting class of primary school art.

3.2.1. Course Concept

With the core concept of "technology empowerment, inheritance and innovation", this course aims to reconstruct the teaching path of traditional paper-cut art through modern multimedia technology (such as AI, AR, VR, etc.). The course emphasizes the

trinity of "culture technology education" learning process, so that students can understand the cultural connotation and formal beauty of paper cutting in an immersive and interactive digital environment, realize the complete creative experience from traditional skill practice to digital design, from virtual simulation to physical output, and stimulate students' innovative thinking and cultural identity.

3.2.2. Course Objective

Knowledge and skills: Master the basic types, cultural implications and production process of Paper Cuttings; Be able to use at least two kinds of multimedia software (such as AI drawing, AR display, VR modeling, etc.) to assist Paper Cuttings design and performance; Independently complete the complete creation from "digital design" to "manual cutting and engraving".

Process and Method: Through project-based learning and collaborative exploration, experience the creative process of "observation simulation innovation sharing"; With the help of technical tools, Paper Cuttings modeling can be deconstructed, reorganized and dynamically displayed to improve the ability to solve problems.

Emotions, Attitudes, and Values: Enhance students' awareness and sense of responsibility for the protection and inheritance of intangible cultural heritage; Perceive the vitality of traditional art in the fusion of technology, cultivate interest and cultural confidence in cross media creation.

3.2.3. Teaching Plan

Based on the preceding analysis, a 12-lesson "Modern Multimedia + Chinese Paper Cuttings" teaching guideline was developed.The teaching plan is based on the built-in software of the artificial intelligence teaching platform for primary and secondary schools, helping students establish digital operation cognition, systematically learn the types and artistic characteristics of China paper-cutting, and gradually expand to comprehensive practice with diverse tools such as AI, AR, and VR. Through preliminary analysis and selection, modern multimedia software suitable for primary school art classes was determined, serving as a starting point to simultaneously enhance students' digital skills and traditional cultural literacy.

The lesson consists of 12 class hours, divided into six interconnected modules that progressively integrate paper-cutting art with modern technology. Each module systematically outlines core objectives, key challenges, teaching methodologies, and implementation steps,see Table 7.

Table 7. Teaching Plan (6 Unit, 12 Lessons).

Unit	Week	Class Hour	Subject Content
Unit 1: The Application of AI Software in the Study of China paper-cutting	Week 1	2	The Artificial Intelligence Teaching Platform for Primary and Secondary Schools in Guangzhou and the Learning of China Paper-cutting
	Week 2	2	Design of Paper-cut Patterns with AI Drawing Tools
	Week 3	2	Design and creation of paper-cutting with AI-assisted square folding
Unit 2: The Application of AR Software in the Study of China paper-cutting	Week 4	2	AR Technology Cognition and Virtual Display of Hexagonal Folding Paper-cutting
	Week 5	2	AR Technology and the Physical Creation of Four-cornered Folding Paper-cutting

Unit 3: The Application of AR And AI Software in The Study of China paper-cutting	Week 6	2	Combining AI and AR for creative monochrome paper-cutting design in China
	Week 7	2	Combining AI and AR for the creation of China's colored paper-cutting and layered effects
Unit 4: The Application of AI And VR Software in The Study of China paper-cutting	Week 8	2	VR Technology Cognition and Virtual Paper-cut Museum Space Construction
	Week 9	2	Design exhibits with AI and set up displays in VR museums
Unit 5: Making paper-cut Animation with AI Software	Week 10	2	Principle of AI-generated Sequence Frame and Paper-cut Animation
	Week 11	2	Use Different AI Tools to Complete Narrative Paper-cut Animation Short Film
Unit 6: Practice of Multimedia Integration	Week 12	2	Modern multimedia technology combined with China paper-cutting free creation and achievement display

3.2.4. Teaching Guideline for Chinese Paper Cutting with Multimedia Technology

In elementary art education, developing a systematic and user-friendly teaching resource package is essential. This package not only ensures smooth implementation of teaching activities and reduces teachers 'workload in lesson preparation and classroom management, but also serves as a crucial bridge connecting theoretical knowledge with hands-on practice, fostering students' deep learning and creative expression in technology-integrated contexts. To this end, we have developed a comprehensive supporting teaching resource package specifically tailored for this course.

1) Tools List

To help teachers and students master modern multimedia techniques for paper-cutting, the resource package includes a curated list of essential tools:

AI Category: Guangzhou AI powered K-12 school education platform, AI DouBao (digital learning tool), AI Dreamina (digital animation generation)

AR Category: AR Paper-cutting Flower Flower, AR KIVICUBE

VR Category: VR Yuanmei Business Card

2) Lesson Plan Resources

To help teachers apply these resources directly in teaching, the package provides systematic instructional materials, including:

Teaching Plan And Syllabus: Clarify the teaching objectives, content structure, and class hour allocation for each module

Detailed Lesson Plans: Each class includes a complete instructional flow design, covering introduction, lecture, activities, and summary

Complementary Ppt Courseware: A visually rich and step-by-step teaching presentation

Student Self Report: Task Sheets for Guiding Self-directed Exploration and Practice

Course Knowledge Mastery Evaluation By 5 Rating Score Form:A student evaluation tool designed around technology application, artistic performance, cultural understanding and other dimensions

This resource package emphasizes practicality, systematicness, and operability, aiming to provide teachers with "ready-to-use" instructional support to facilitate the organic integration of traditional paper-cutting art with modern multimedia technology.

This resource package emphasizes practicality and operability, providing teachers with "ready-to-use" instructional support for integrating traditional paper-cutting art with modern multimedia technology.

3.2.5. Guideline Validation

The developed guideline was evaluated by a new panel of three experts using an IOC form, and the results are summarized in Table 8. It received a high average score of 0.97, indicating excellent alignment with its intended objectives. A pilot test of four lessons (Units 1 & 2) with fifth-grade students showed high levels of engagement. In the AI design lesson, approximately 85% of students could successfully input compound commands. During the AR experience, students exhibited strong curiosity and a sense of achievement, demonstrating the model's effectiveness in stimulating interest and bridging the virtual and physical worlds.

Table 8. Teaching Guide Objective Consistency Index (IOC) Scoring Table.

Theoretical Basis And Design Concept	Score	
	Total Points	Score
1. Does the course concept effectively balance the dual goals of traditional cultural inheritance and digital innovation ability cultivation?	3	1
2. Does the "culture technology education" learning model based on this course conform to the cognitive development laws and artistic learning characteristics of primary school students?	3	1
Alignment Of Teaching Objectives And Content	**Score**	
	Total Points	Score
3. Does the course objective clearly reflect the integration of Paper Cuttings art knowledge, multimedia technology skills and aesthetic cultural literacy?	3	1
4. Is the progressive structure of the six modules (AI, AR, VR, animation, and integrated practice) in the course reasonable? Does it conform to the cognitive and skill development laws of elementary school students?	3	1
Teaching Implementation And Resource Support	**Score**	
	Total Points	Score
5. Is the class hour distribution between the knowledge content of Paper Cuttings art (such as patterns, folding techniques) and the operation of technical tools balanced?	3	1
6. Are the provided teaching resource packages (lesson plans, PPT, lesson plans, tool lists, etc.) complete and clear, and can they effectively support teachers in carrying out teaching?	3	1
Student Participation And Development Assessment	**Score**	
	Total Points	Score
7. Does the course fully stimulate students' active exploration and creative motivation? Can it promote students' confidence building in technology and art?	3	1
8. Does the evaluation method in the course balance process performance and work results, and can it truly reflect students' growth in technology application, creative expression, and cultural understanding?	2	0.67

Applicability And Promotion Value Of The Course	Score	
	Total Points	Score
9. Does the course structure have the possibility of being implemented in primary schools with different regions and equipment conditions?	3	1
10. Can the promotion and implementation of the course achieve a balanced implementation of cultural heritage and digital innovation education goals through modular adjustment and resource adaptation?	3	1
Average	2.9	0.97

3.2.6. Teaching Try Out

Four lessons were tested in Class 3 and Class 4 of Grade 5, as well as the Art Club. Results showed: About 85% of students could accurately input compound AI instructions Students exhibited strong curiosity and sense of achievement in AR experiences Students could objectively analyze differences between virtual designs and physical works Student Feedback: Students showed strong interest in AI and AR technologies, positive feedback on "digital design + manual implementation" mode, and enhanced sense of achievement through sharing and discussion.

4. Conclusion

4.1. Conclusion of Study and Analyze the Application of Chinese Paper Cutting in Modern Multimedia Technology-based Teaching

(1) Systematic Construction of Classification System: This study systematically combed through seven major classification dimensions of China paper-cutting, constructing a clearly stratified and structurally complete classification framework. "Symmetrical paper-cutting" and "cluster flower paper-cutting" were identified as the most suitable for primary school art classes.

(2) Analysis of Teaching Adaptability: AI tools are suitable for pattern generation and creative inspiration; AR tools enhance virtual-real interaction and display experiences; VR tools support virtual exhibition and spatial construction. Technology should be positioned as a "creative inspiration tool" rather than a "template-based production mold."

(3) Core Logic of Technology Integration: Experts unanimously endorsed a "digital design + manual execution" approach, emphasizing the instructional sequence of "artistic transmission before technical instruction."

4.2. Conclusion of Develop Chinese Paper Cutting Application Guideline

(1) Matching Needs: Teacher surveys showed 85% urgently need "subject-adapted resources"; student surveys indicated preference for teamwork, gamified learning, and virtual reality.

(2) Innovative Course System: A 12-hour progressive course system consisting of six modules was developed, featuring the integration framework of "culture-technology-education" and the creative path of "digital design + manual practice."

(3) Course Validation: IOC evaluation (0.97) and teaching experiments confirmed the course's effectiveness in enhancing students' participation, creativity, and cultural understanding.

The limitation of this reseach lies in the limited sample size, which is concentrated in a primary school in Guangzhou; Rapid technological iteration requires continuous adaptation; Untested long-term impact. Therefore, suggestions for future research:

1) Expand the research scope to schools with different regions and equipment conditions.
2) Deepen technological integration with MR and AIGC advancements.
3) Build a digital ecosystem for "Paper-cutting Intangible Cultural Heritage Digital Education Platform".
4) Promote the course through teacher training, resource co-construction, and inter-school collaboration.

By systematically integrating paper-cutting art with multimedia technology, this study has developed a teaching guide that combines cultural depth with technological breadth, providing a practical approach for elementary school art instruction in paper-cutting.

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