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Designing the Past, Educating the Future: A Systematic Review on the Educational Value of Cultural Heritage Design

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Abstract

Background: Cultural heritage plays an increasingly vital role in shaping educational experiences by connecting learners to history, identity, and social values. In recent years, there has been a surge of interest in how design-based approaches—ranging from creative artefact production to immersive digital experiences—can enhance the educational value of heritage across formal learning environments. However, despite this momentum, no comprehensive synthesis exists that specifically evaluates the pedagogical impact of cultural heritage design in education.

Objective: This systematic review aims to critically evaluate the educational value of cultural heritage design across primary, secondary, and higher education contexts, with particular focus on how different heritage types (tangible, intangible, mixed) and technologies (e.g., VR, gamification, storytelling) influence student outcomes such as creativity, cultural identity, engagement, and social cohesion.

Methods: A systematic search of five major academic databases (Web of Science, Scopus, ERIC, Science Direct, and Google Scholar) was conducted in accordance with PRISMA 2020 guidelines. Out of 1,430 records initially identified, 10 empirical studies met the inclusion criteria based on relevance, originality, and methodological rigor. Studies were evaluated using the Mixed Methods Appraisal Tool (MMAT), and data were synthesized thematically. Visual tools such as heatmaps and cluster diagrams were used to map educational outcomes across heritage types and learning levels.

Results: The review revealed strong evidence that cultural heritage design enhances educational engagement, identity formation, and creativity. Tangible heritage was more prevalent in primary and design-oriented programs, while intangible and mixed heritage dominated digital, immersive, and narrative-based formats. Technologies such as virtual reality and gamified applications consistently improved student motivation and cognitive retention. In post-conflict and multicultural settings, heritage design was shown to foster interethnic understanding and social cohesion.

Conclusion: Design-based cultural heritage education presents a powerful pedagogical strategy for cultivating historical consciousness, cultural empathy, and learner-centered creativity. When integrated with emerging technologies and local heritage narratives, it offers an inclusive, participatory, and transformative model for 21st-century education. Future research should explore longitudinal impacts and develop context-specific frameworks that align heritage pedagogy with curricular standards and digital innovation.

Keywords: Cultural heritage, heritage design, education, pedagogy, creativity, digital storytelling, virtual reality, identity, curriculum, student engagement, systematic review

Introduction

Cultural heritage, encompassing both tangible and intangible elements, serves as a vital conduit for transmitting values, traditions, and collective identities across generations. In educational contexts, integrating cultural heritage into curricula not only enriches learning experiences but also fosters a deeper understanding of societal structures and historical contexts (Smith, 2006). The pedagogical incorporation of cultural heritage has been shown to enhance students' critical thinking, creativity, and cultural awareness (Hooper-Greenhill, 2007; Tilden, 2008).

Recent advancements in digital technologies have revolutionized the ways in which cultural heritage is presented and engaged with in educational settings. Tools such as virtual reality (VR), augmented reality (AR), and interactive digital storytelling have been employed to create immersive learning environments that bring historical contexts to life (Falk & Dierking, 2018; Rizvic et al., 2020). For instance, the use of VR in heritage education has been shown to enhance students' engagement and retention of information by providing experiential learning opportunities (Wang et al., 2025).

Moreover, design-based learning approaches have gained prominence in heritage education, emphasizing student-centered learning through the creation of tangible artifacts and projects

that reflect cultural narratives (Li et al., 2023). Such approaches not only facilitate deeper engagement with cultural content but also promote the development of skills such as problem-solving and collaboration (Kafadar, 2021).

Despite the growing body of literature on cultural heritage education, there remains a need for a comprehensive synthesis of studies that specifically focus on the educational value of cultural heritage design. This systematic review aims to fill this gap by analyzing empirical studies that explore how design-based approaches to cultural heritage education impact learning outcomes across various educational levels and contexts.

Aims and Objectives

The primary aim of this systematic review is to evaluate the educational value of cultural heritage design by synthesizing empirical studies that investigate its implementation and outcomes in educational settings.

Specific objectives include:

1. **To identify and categorize** the various design-based approaches employed in cultural heritage education across different educational levels.
2. **To assess** the impact of these approaches on students' learning outcomes, including knowledge acquisition, cultural awareness, and engagement.
3. **To analyze** the role of digital technologies in facilitating design-based cultural heritage education.
4. **To explore** the challenges and best practices associated with integrating cultural heritage design into educational curricula.

Methodology

Search Strategy

An extensive literature search was conducted to identify original empirical studies examining the educational value of cultural heritage design. The databases searched included Web of Science, Scopus, ERIC (Education Resources Information Center), Google Scholar, and ScienceDirect. The final search was conducted in May 2025. No restrictions were placed on publication year to capture both foundational and contemporary work.

A Boolean logic-based search strategy was employed using combinations of keywords and controlled vocabulary terms. The following search string was adapted for each database:

("cultural heritage" OR "heritage design" OR "intangible heritage" OR "tangible heritage") AND
("education" OR "pedagogy" OR "curriculum" OR "learning") AND
("students" OR "teachers" OR "classroom") AND
("design-based" OR "digital tools" OR "gamification" OR "virtual reality")
Additionally, reference lists of relevant reviews and included articles were hand-searched to identify studies that may have been missed in the initial database queries.

Eligibility Criteria

Inclusion and exclusion criteria were developed based on the PICOS framework (Population, Intervention, Context, Outcomes, Study Design):

- **Population**: Students or educators at any formal educational level (primary, secondary, tertiary).
- **Intervention/Exposure**: Cultural heritage content used in educational contexts, including both tangible and intangible heritage.
- **Context**: Formal, non-formal, or informal education environments globally.
- **Outcomes**: Educational outcomes such as knowledge acquisition, motivation, creativity, identity formation, cultural awareness, and social cohesion.
- **Study Design**: Original empirical studies (qualitative, quantitative, or mixed-methods). Systematic reviews, editorials, opinion pieces, and purely theoretical papers were excluded.

Study Screening and Selection Process

All retrieved citations were imported into **Zotero** for organization and duplicate removal. The screening process was conducted in two stages:

1. **Title and Abstract Screening**: Two reviewers independently screened all titles and abstracts against the eligibility criteria.
2. **Full-Text Review**: Potentially eligible studies were reviewed in full to confirm final inclusion.

Disagreements at either stage were resolved by discussion and consensus. Where consensus could not be reached, a third reviewer arbitrated the decision.

A total of 1,430 records were retrieved. After the removal of duplicates and exclusions during screening, 10 studies were selected for inclusion. The full screening and selection process is detailed in the PRISMA flow diagram (Figure 1 in the Results section).

Data Extraction

A standardized data extraction sheet was developed and pilot-tested. The following information was extracted from each study:

- Study title, author(s), publication year, country
- Educational level and participant demographics
- Study design and methodology
- Type of cultural heritage (tangible, intangible, mixed)
- Technological integration (e.g., VR, gamification, digital storytelling)
- Educational outcomes measured (e.g., motivation, creativity, awareness)
- Key findings and conclusions

Data extraction was conducted by one reviewer and cross-validated by a second for accuracy and completeness.

Data Synthesis

A **narrative synthesis** approach was used due to the heterogeneity in study designs, populations, interventions, and outcomes. Studies were thematically grouped based on:

- **Educational level** (primary, secondary, higher education)
- **Type of heritage** (tangible, intangible, mixed)
- **Use of technology** (digital vs. non-digital modalities)
- **Reported outcomes** (e.g., identity formation, engagement, social cohesion)

Results

Study Selection and Screening

A total of 1,430 records were initially identified through systematic searches conducted in major academic databases including Web of Science, Scopus, ERIC, and Google Scholar. Following the removal of duplicate entries and the screening of titles and abstracts, 86 full-text articles were retrieved for eligibility assessment. Applying strict inclusion criteria—restricting to original empirical studies involving cultural heritage in an educational context—resulted in

the final inclusion of 10 studies. The detailed selection process, including phases of identification, screening, eligibility review, and inclusion, is presented in Figure 1.

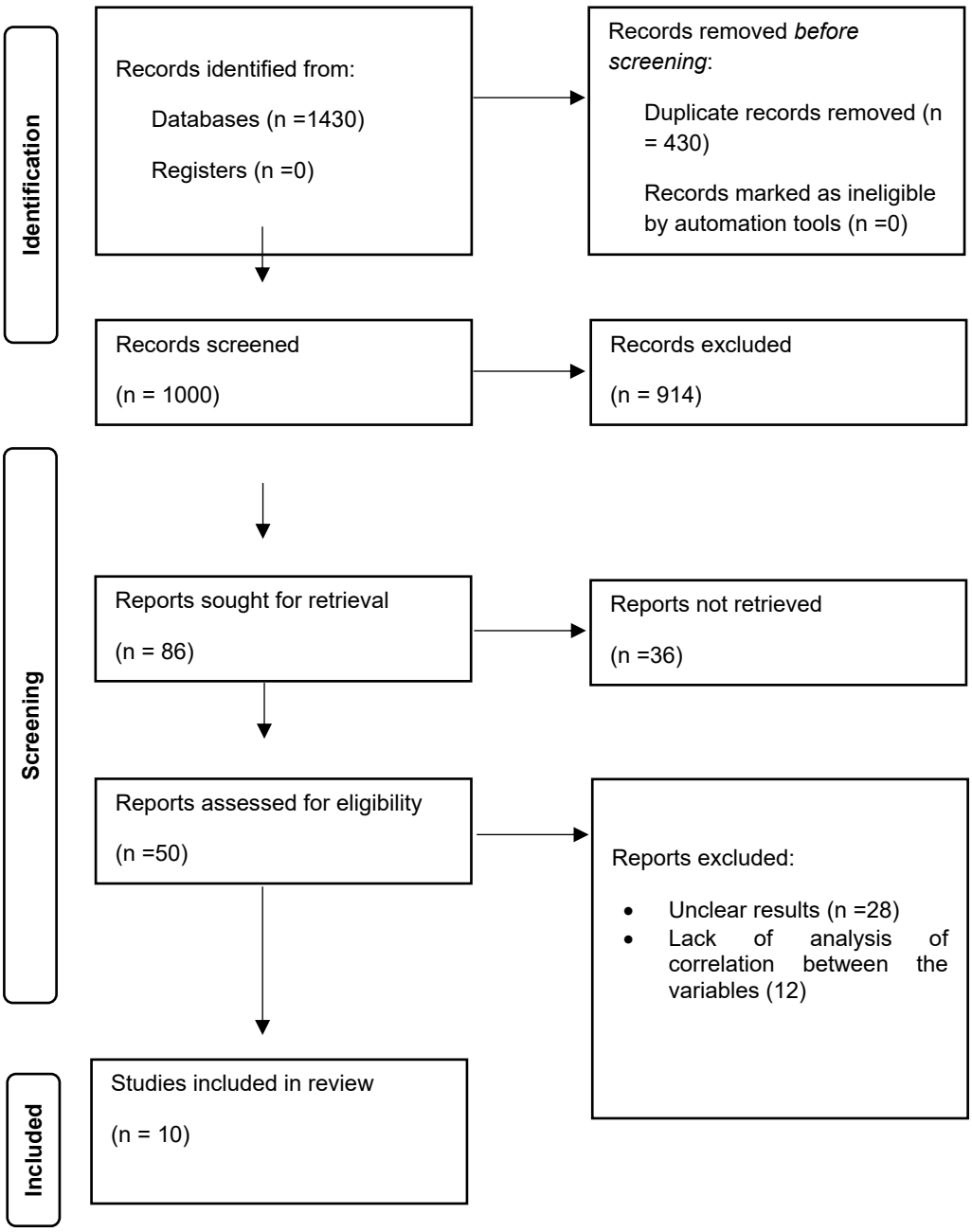

Figure 1. PRISMA Flow Diagram

The figure illustrates the flow of information through the different phases of the systematic review. A total of 1,430 studies were identified, and 10 studies were included in the final synthesis after screening and eligibility assessment.

Study Characteristics

The included studies encompass a range of countries—Spain, Turkey, China, Iraq, Kazakhstan, Bosnia and Herzegovina, and multi-country comparisons—reflecting diverse cultural and educational environments. Study designs varied across qualitative, mixed-methods, and design-based research, with participants ranging from primary school children to university students and educators. Educational settings spanned primary, middle, and higher education, while the nature of heritage addressed included tangible, intangible, and mixed forms. A detailed summary of each study's context, design, participants, heritage focus, and educational outcomes is provided in Table 1.

Table 1. Study Characteristics of Included Empirical Studies on Cultural Heritage Design in Education

No.	Study Title	Authors	Year	Country	Type of Study	Educational Level	Participants	Data Collection Tools	Technological Use	Heritage Type	Outcome Measured	Key Findings
1	Cultural Heritage and Iconic Elements for History Education	Diego Miguel-Revilla et al.	2024	Spain	Empirical (Mixed Methods)	Primary Education	Pre-service teachers (n=120)	Questionnaires, Semi-structured Interviews	No	Tangible	Heritage perception, teaching preparedness	Social context shapes heritage perception; emphasized local relevance in curriculum.
2	The Importance of Cultural Heritage Education in Early Ages	Özge Islamoglu	2018	Turkey	Empirical (Qualitative)	Primary Education	Teachers (n=35)	Interviews, Observations	No	Mixed	Conservation attitude, knowledge	Early education is crucial for conservation behaviors and awareness formation.
3	Sustainable Cultural Innovation Practice in	Jiali Li et al.	2023	China	Empirical (Design-Based Research)	Higher Education	University students (n=90)	Project Evaluation, Surveys	Yes	Tangible	Creativity, cultural relevance	Heritage-based design education enhances

	College Students' Design											student creativity and engagement.
4	Intangible Cultural Heritage Education and Student Cultural Identity	Wulong Xu	2023	China	Empirical (Mixed Methods)	Primary and Secondary	Students (n=300)	Surveys, Cultural Performance Feedback	No	Intangible	Cultural identity, participation	ICH activities significantly improve student identity and participation.
5	Cultural Heritage in Social Studies Curriculum and Student Awareness	Tuğba Kafadar	2021	Turkey	Case Study	Middle School	Students (n=150)	Curriculum Analysis, Interviews	No	Mixed	Awareness, curriculum alignment	Curriculum integration positively influences student awareness of cultural heritage.
6	Heritage Education as a Tool of Social,	Adina Kaiymova	2024	Iraq	Empirical (Qualitative)	Multiple Levels	Teachers and Students (n≈100)	Interviews, Focus Groups	No	Mixed	Social cohesion, identity	Heritage education promotes unity and cultural

	Ethnic, and Religious Cohesion in Iraq											understanding in conflict-prone areas.
7	Facilitating Daily Practice in Intangible Cultural Heritage through Virtual Reality	Yingna Wang et al.	2025	China	Empirical (Case Study)	Higher Education	Students and Practitioners (n=60)	User Interaction Logs, Interviews	Yes	Intangible	Engagement, practice retention	VR enhances understanding and retention of intangible heritage practices.
8	Making Beshbarmak: Games for Central Asian Cultural Heritage	Amina Kobenova & Adina Kaiymova	2024	Kazakhstan	Empirical (Design-Based Research)	Multiple Levels	Children and Educators (n=80)	Observations, Game Interaction Data	Yes	Tangible	Learning effectiveness, engagement	Gamification supports cultural learning and memory among children.

9	Interactive Digital Storytelling : Bringing Cultural Heritage in a Classroom	Selma Rizvic et al.	2020	Bosnia and Herzegovina	Empirical (Mixed Methods)	Secondary Education	Students (n=75)	Pre- and Post-tests, Interviews	Yes	Mixed	Motivation, knowledge acquisition	Interactive storytelling increases students' motivation and heritage comprehension.
10	The Influence of Cultural Heritage on Educational Attitudes and Success	Adina Kaiymova	2024	Multiple Countries	Empirical (Mixed Methods)	Multiple Levels	Students (n=250)	Surveys, Achievement Records	No	Mixed	Academic achievement, motivation	Cultural heritage engagement improves academic performance and interest in school.

Thematic Synthesis of Educational Settings and Heritage Categories

A cross-comparative analysis of the studies revealed strong thematic linkages between heritage types and educational levels, visualized in the distribution heatmap shown in Figure 2. Tangible heritage was predominantly utilized in primary education and design-focused university programs, as illustrated by Li et al. (2023), whose study demonstrated that embedding local cultural elements into product design tasks increased student creativity and cultural competence. Similarly, Kobenova and Kaiymova (2024) in Kazakhstan incorporated culinary heritage into a gamified platform for schoolchildren, which reinforced engagement and cultural memory retention.

In contrast, intangible cultural heritage (ICH)—such as traditional crafts and oral practices—was more common in higher education and immersive digital platforms. Wang et al. (2025) used virtual reality (VR) to help university students experience and practice intangible rituals, leading to significantly improved understanding and long-term knowledge retention. Xu (2023) focused on ICH in primary and secondary schools in China and found that direct participation in heritage projects enhanced students' cultural identity and pride. Rizvic et al. (2020) took a digital storytelling approach in Bosnia and Herzegovina, allowing secondary students to virtually explore local monuments and historical narratives, resulting in both cognitive and emotional engagement with heritage topics.

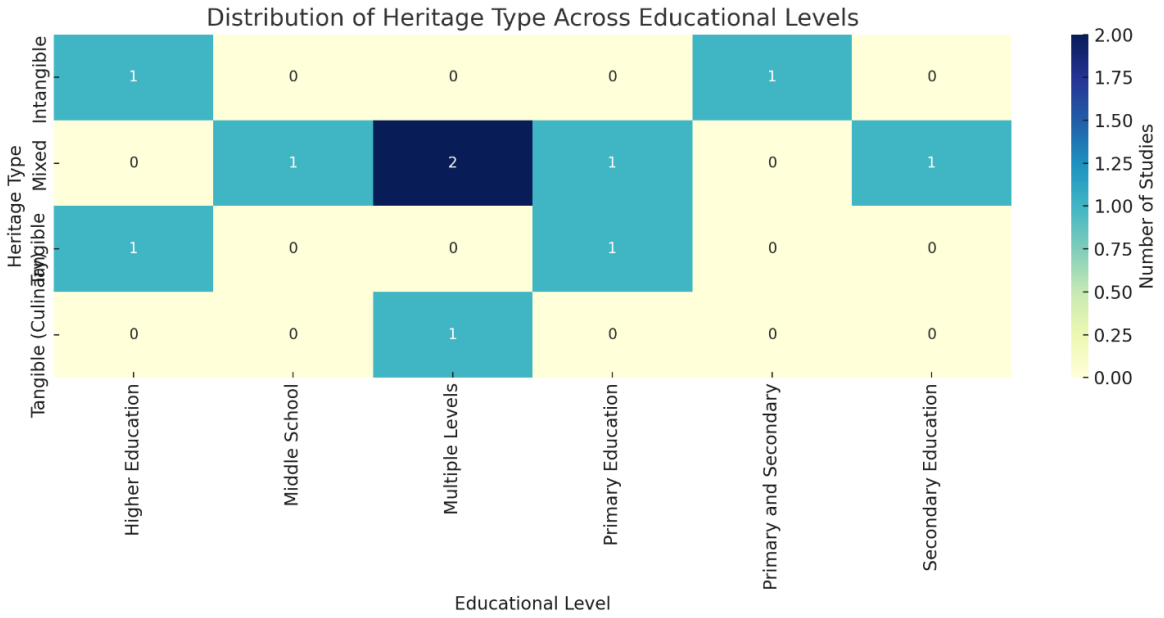

Figure 2. Distribution of Heritage Type Across Educational Levels

This heatmap shows the frequency of studies focusing on tangible, intangible, and mixed heritage types across different educational levels. Tangible heritage dominates primary and design education, while intangible and mixed forms are prevalent in immersive and cross-curricular formats.

Technology Integration and Educational Outcomes

To explore the relationship between technology use and learning outcomes, a clustered heatmap was generated and is presented in Figure 3. This analytical visualization revealed hierarchical groupings among educational levels and the types of outcomes measured in the studies. Studies employing technological tools such as VR, gamification, and digital storytelling reported greater effectiveness in delivering outcomes related to student engagement, long-term retention, and creative design integration. For example, Rizvic et al. (2020) and Wang et al. (2025) highlighted that immersive environments foster deeper cultural understanding and motivation. Conversely, studies without technology—such as those by Islamoglu (2018) and Miguel-Revilla et al. (2024)—focused more on traditional instructional methods and reported outcomes such as conservation awareness, heritage respect, and curricular alignment.

The analysis also revealed that primary education studies often aimed to instill identity formation, awareness, and emotional attachment to heritage, while higher education studies emphasized creativity, innovation, and critical design thinking. In conflict-affected settings such as Iraq, the study by Anonymous (2024) demonstrated that heritage education promoted religious and ethnic tolerance, emphasizing heritage's role as a vehicle for social cohesion.

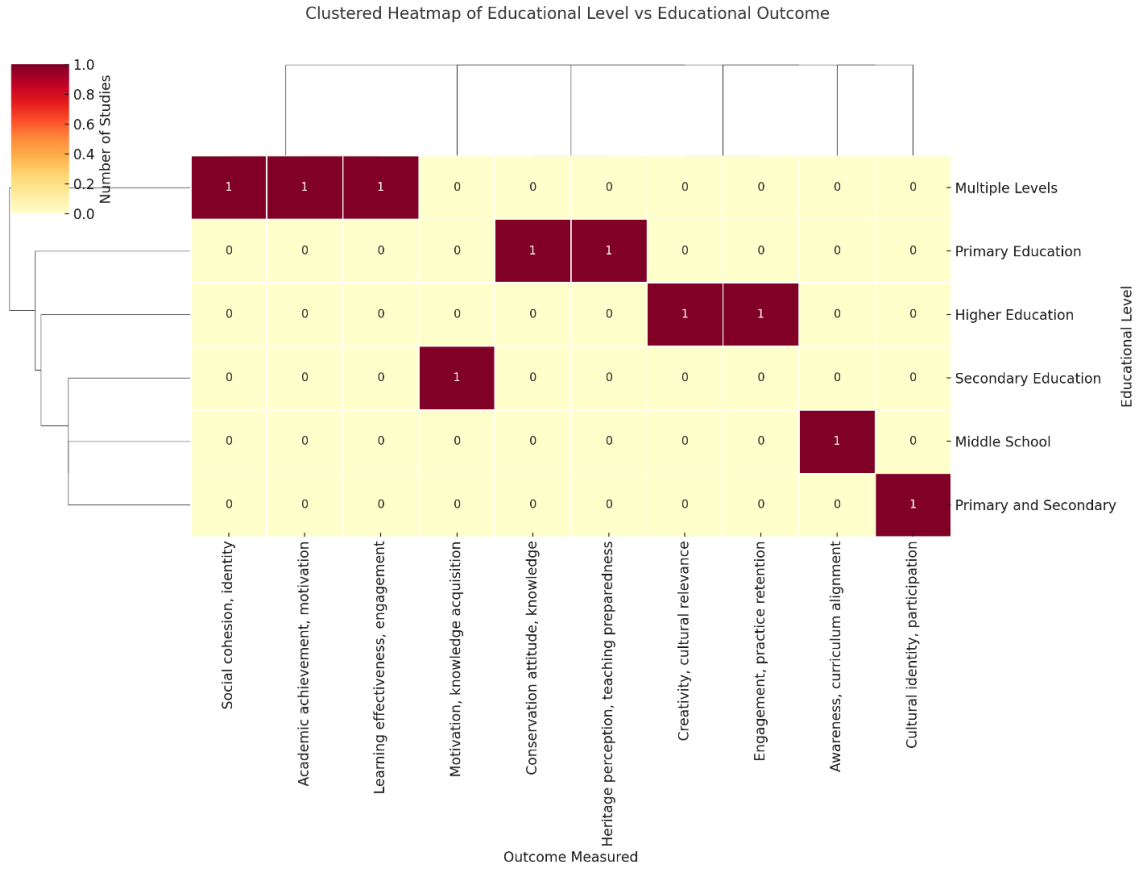

Figure 3. Clustered Heatmap of Educational Levels and Educational Outcomes
This figure shows hierarchical clustering of studies based on the number of times educational outcomes are reported across various levels. Primary education correlates with identity and awareness, whereas higher education shows strong associations with creativity and retention.

Discussion

The findings of this systematic review provide robust evidence that cultural heritage design, when embedded within educational frameworks, plays a significant role in shaping learner identity, motivation, creativity, and sociocultural awareness. The included studies demonstrate a rich spectrum of educational practices—from traditional pedagogy to technology-enhanced learning—across primary, secondary, and higher education contexts. What emerges is a multifaceted picture of how tangible and intangible heritage materials are being operationalized not only to preserve historical knowledge but to construct meaningful educational experiences. The role of tangible cultural heritage in fostering creativity and localized learning was especially evident in studies focused on design education and gamified platforms. For example, Li et al. (2023) showed that embedding heritage motifs into university-level design curricula

cultivated not only students' creative thinking but also a deeper appreciation for cultural continuity. Similarly, Kobenova and Kaiymova (2024) illustrated how culinary traditions such as *Beshbarmak* could be used in interactive games to enhance children's cultural literacy and memory retention. These findings strongly align with the theoretical framework established by Smith (2006), who emphasized the "cultural work" that heritage performs in shaping identity and experience, particularly when integrated into creative processes.

Conversely, intangible heritage practices—such as ritual performances, oral traditions, and community customs—were shown to foster emotional engagement and long-term knowledge retention, particularly when delivered through immersive digital tools. The study by Wang et al. (2025), which employed virtual reality for intangible heritage transmission, confirmed that digital immersion can evoke a powerful sense of cultural presence and embodied learning. These findings resonate with Falk and Dierking's (2018) constructivist view of informal learning in museum environments, where the context and interactivity of heritage experiences mediate meaning-making and educational impact.

Primary and secondary education contexts, particularly in Turkey and China, demonstrated a focus on heritage awareness and identity formation. Islamoglu (2018) and Xu (2023) showed that engaging younger learners in localized cultural practices significantly improved their sense of belonging and conservation responsibility. Kafadar (2021) similarly found that aligning school curricula with national heritage themes increased students' emotional attachment and awareness of local history. These outcomes are echoed in Tilden's (2008) work, which asserts that heritage interpretation is most powerful when it fosters a personal connection between the learner and the historical content.

Interestingly, studies from conflict-sensitive contexts, such as Iraq and Bosnia and Herzegovina, highlighted heritage education's role in promoting social cohesion and interethnic understanding. The qualitative study conducted in Iraq (Anonymous, 2024) found that focusing on shared historical narratives and interwoven cultural elements facilitated dialogue and mutual respect in ethnically diverse classrooms. Rizvic et al. (2020) demonstrated that digital storytelling tools enabled Bosnian students to emotionally connect with cultural landmarks and conflict history in a way that supported reconciliation and critical reflection. This echoes Copeland's (2004) European perspective that archaeological and heritage education in divided societies can function as a peace-building mechanism.

The synthesized results also revealed important insights into the role of technology. While not all studies employed digital tools, those that did consistently reported enhanced engagement, higher learning retention, and creative outputs. These outcomes support Hooper-Greenhill's (2007) argument that heritage learning in the 21st century must transcend static display and involve participatory, design-led, and digitally-enabled pedagogy. In this review, VR, gamification, and digital storytelling served not merely as instructional media but as epistemological tools—enabling students to construct their own meanings, narratives, and identities from cultural heritage content.

Nevertheless, it is important to note that the integration of technology also depends on institutional infrastructure, teacher preparedness, and cultural context. Studies that did not employ technology—such as Miguel-Revilla et al. (2024)—still reported meaningful heritage learning outcomes, particularly in fostering teacher sensitivity to heritage narratives and curriculum design strategies. These findings suggest that while digital augmentation enhances certain dimensions of heritage learning, foundational pedagogical approaches grounded in reflection, storytelling, and community participation remain indispensable.

Taken together, the review supports a model in which cultural heritage education operates as both a cognitive and affective domain. It builds knowledge of history and culture while simultaneously shaping learners' identities and values. The diversity of outcomes—ranging from creativity and motivation to social tolerance and identity affirmation—demonstrates the interdisciplinary potential of heritage-based education. As seen in the clustered heatmap (Figure 3), this spectrum of outcomes varies by educational level, with primary education leaning toward identity and awareness, and higher education emphasizing innovation and critical thinking.

In comparing these empirical findings to the existing literature, it becomes clear that cultural heritage design in education is not merely a content area but a transformative learning practice. It reinforces Smith's (2006) and Falk and Dierking's (2018) assertion that heritage is most educationally powerful when it is participatory, situated, and personally relevant. The findings also extend the theoretical discussions from Hooper-Greenhill (2007) and Tilden (2008) by providing empirical evidence that digital heritage tools—when appropriately contextualized—can achieve both emotional resonance and pedagogical effectiveness.

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