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Cultural Code in Motion: Animating Indigenous Design Patterns for Contemporary Digital Storytelling

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Abstract. *This study explores the integration of indigenous design aesthetics into multimodal digital storytelling systems powered by artificial intelligence (AI). It proposes a culturally adaptive framework that embeds emotional and symbolic dimensions derived from indigenous traditions into user experience (UX) and affective computing design. Drawing upon literature from affective computing, cognitive-affective UX, and cultural semiotics, the research develops a theoretical model that aligns multimodal AI interactions with culturally grounded visual and narrative elements. The framework aims to support digital storytelling platforms in capturing and conveying indigenous values through responsive AI interfaces that interpret voice, gesture, and emotion. A hypothetical case scenario is presented to illustrate how the framework could function in practice, involving indigenous youth narrating traditional stories through AI-enhanced environments. This conceptual investigation is intended for practitioners in digital storytelling, UX design, and AI development who seek to create more inclusive and culturally responsive digital experiences. By centering indigenous knowledge systems in AI interaction design, this study contributes to ongoing conversations on decolonizing technology and promoting ethical, emotionally resonant design practices. Future work includes empirical testing of the framework within community-based storytelling initiatives.*

Keywords: *Indigenous Design Patterns, Digital Storytelling, Cultural Preservation, Motion Graphics, Ethnic Visual Aesthetics*

INTRODUCTION

The rapid evolution of artificial intelligence (AI), affective computing, and multimodal interaction technologies has fundamentally reshaped how humans create, perceive, and interact with digital content. In a digital era where education, entertainment, commerce, and communication converge within complex platforms, the capacity of systems to interpret not only information but also human emotion, visual preference, and user experience (UX) is becoming increasingly vital. These technologies are no longer confined to backend processing; they are embedded in the frontlines of design workflows, learning systems, and user interfaces (Marciano et al., 2022). As a result, understanding the role of emotion, cognition, and cultural relevance in digital design is emerging as a critical academic and practical pursuit (Amin et al., 2023; Anantrasirichai & Bull, 2022; Gervasi et al., 2023; Haider & English, 2021; Hamidli, 2023).

In particular, the growing integration of affective computing and multimodal systems those that combine audio, visual, and textual inputs has expanded the potential for designing emotionally intelligent digital experiences. Recent research suggests that emotion-aware AI systems can significantly boost user engagement, especially in creative and culturally expressive

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settings (Han et al., 2022; Kazemitabaar et al., 2024; Saleem Abdullah et al., 2021). The convergence of affective and cognitive design principles has thus become central to advancing UX across applications such as immersive storytelling, social media, and digital heritage platforms (Al-Hunaiyyan et al., 2021; Gunawan et al., 2021; Hammer & Ed, 2020). However, despite these advancements, many systems still struggle to deliver truly adaptive and personalized experiences particularly in culturally diverse or emotionally nuanced environments (Borre et al., 2023).

Rather than centering on educational psychology or learning motivation, this study specifically examines how indigenous design aesthetics can be embedded into multimodal AI systems to support emotionally resonant and culturally grounded digital storytelling. These considerations are vital given the increasing role of generative AI tools in shaping not only content but also the cultural narratives they encode. Yet, despite these innovations, current AI systems often neglect key elements such as cultural aesthetics, multimodal perception, and the dynamic interplay of sensory modalities. These omissions may limit the inclusivity, expressiveness, and overall effectiveness of AI-generated outputs, especially when applied across diverse user groups (Arian et al., 2023; Buschgens et al., 2024; Cui et al., 2024). The integration of emotion, culture, and perception must be addressed not only as design considerations but as foundational principles for future digital systems. Without this integration, user experiences risk becoming overly standardized and emotionally disengaging (Saranya et al., 2025).

Simultaneously, scholarly interest in how multimodal AI systems interpret human emotion and how these capabilities influence usability, trust, and satisfaction is on the rise. (Deng & Ren, 2023) highlight the limitations of textual emotion recognition, noting that many systems lack the contextual sensitivity required for nuanced interpretation. (Hu et al., 2024) similarly emphasize the struggles faced by NLP-based affective computing in grasping cultural subtleties and integrating real-time, multimodal inputs. These challenges are particularly acute in domains such as indigenous storytelling, AI-generated art, and cultural branding, where emotional tone and perceptual quality are critical to user acceptance (Iswanto, 2022; Karsono et al., 2021).

Although the technical foundations of emotion recognition, UI design, and AI-generated content have been well explored, few studies explicitly bridge these aspects with cultural-contextual variables in real-world applications. This constitutes a significant gap in the literature. For example, while (Gervasi et al., 2023) acknowledge the potential of affective computing in human-robot interaction, they also admit that cultural aesthetics and emotional resonance are often overlooked. Likewise, (Ariza-Colpas et al., 2024) and others stress the value of hybrid

technologies for heritage preservation but argue for a deeper integration of sensory, symbolic, and emotional dimensions in digital design practices (Erjansola et al., 2021; Go & Mothelsang, 2024).

Despite increasing discourse on culturally adaptive design and digital heritage, the link between affective-multimodal systems and archival design remains underdeveloped. Specifically, it is unclear how emotion-sensitive digital interfaces might support the documentation, transmission, or reinterpretation of cultural narratives in long-term digital archives (L. Huang & Jia, 2022). Existing research tends to describe the aesthetic potential of multimodal AI in abstract or general terms, without offering empirical evidence. Visual analysis, user testing, and interactive observation remain underutilized methods for understanding the real-world impact of these systems.

This research addresses that gap by focusing on how multimodal AI systems can support the preservation, revitalization, and communication of indigenous cultural knowledge through emotionally intelligent design. It explores how cognitive-affective multimodal design principles can be systematically embedded in AI-driven systems to enhance symbolic storytelling, emotional resonance, and cultural fidelity. The study synthesizes insights from affective computing, UX research, and digital aesthetics to develop a conceptual model of multimodal design that is emotionally intelligent, perceptually rich, and culturally adaptive. It emphasizes the importance of aligning technical innovation with human-centered values, particularly in designing inclusive and expressive storytelling tools. Through this interdisciplinary lens, the research intends to generate actionable knowledge for developing culturally sensitive AI systems.

The main objectives of this study are threefold: (1) to synthesize current scholarship on affective and multimodal AI design; (2) to identify critical limitations in current systems' ability to detect and respond to emotional cues across sensory modalities; and (3) to propose a framework that integrates cultural, aesthetic, and emotional dimensions into AI-based user interactions. Through these goals, the study aims to offer a new paradigm for designing human-centered AI systems. These systems are envisioned to go beyond efficiency, embedding deeper layers of emotional and cultural intelligence. Ultimately, the framework emphasizes how indigenous design patterns and multimodal AI can converge to create emotionally grounded digital storytelling environments.

This study makes theoretical, methodological, and practical contributions to the fields of artificial intelligence, human-computer interaction (HCI), and digital aesthetics (Prihatmoko & Setiyadi, 2024). Theoretically, it extends existing models of multimodal emotion recognition by incorporating cultural and cognitive-affective elements (Bisset Delgado, 2022; Burns et al., 2022). Methodologically, it adopts an interdisciplinary approach by drawing from UX design,

media studies, cognitive science, and the creative arts. Practically, the proposed framework offers design implications for practitioners such as digital storytellers, UX designers, and AI developers interested in embedding indigenous cultural patterns and emotional nuance into interactive media systems.

Given these objectives and contributions, the guiding research questions of this study are: (1) How do current multimodal AI systems incorporate affective and cognitive design principles in user interaction? (2) What are the limitations of existing UX models in accounting for cultural aesthetics and emotional variability? (3) How can a multimodal, emotion-aware design framework improve user engagement in culturally grounded digital storytelling platforms? These questions form the analytical foundation for the paper's conceptual exploration.

This paper is structured to systematically address the above research questions while proposing a culturally sensitive framework rooted in indigenous aesthetics. The next sections include a literature review, a conceptual model, and practical illustrations. A hypothetical case study is also presented to clarify potential applications of the model in indigenous storytelling contexts. This approach aims to bridge theoretical insights with practical design strategies for more inclusive and emotionally resonant AI systems.

LITERATURE REVIEW

To develop a culturally adaptive and emotionally intelligent AI design framework, this literature review is structured around three key domains: affective computing and multimodal systems, cognitive-affective UX design, and cultural aesthetics in human-computer interaction (HCI). Each domain reflects a critical intersection between technology, emotion, and cultural sensitivity, which are essential for creating meaningful AI interactions. These thematic pillars allow for a comprehensive understanding of how AI systems can be designed to align with users' emotional and cultural needs. The review culminates in the synthesis of findings to construct a conceptual framework for emotionally and culturally resonant AI design.

A. Affective Computing and Multimodal Systems

Affective computing has advanced rapidly in recent years, integrating multimodal input such as facial expressions, voice tone, text, and gestures to detect emotional states (Deng & Ren, 2023; Han et al., 2022; Liu et al., 2024). These systems have been deployed in education, entertainment, and virtual assistants, improving user engagement through emotional responsiveness (Hu et al., 2024; Saleem Abdullah et al., 2021). Multimodal systems that combine visual and auditory data with contextual feedback can significantly improve user experience, particularly in adaptive learning platforms (Al-Hunaiyyan et al., 2021; Gunawan et al., 2021).

However, their effectiveness is often limited by challenges in synchronizing data inputs and accounting for cross-cultural emotional expressions.

Despite technical advancements, many models struggle to interpret ambiguous emotions or culturally nuanced expressions. (Deng & Ren, 2023) emphasize that large language models still face difficulties recognizing context-specific emotional cues embedded in culture and language. Similarly, (Hu et al., 2024) identify limitations in temporal alignment between input channels, reducing the accuracy of emotion recognition in diverse settings. This highlights the need for emotionally intelligent AI systems that are not only data-driven but also culturally perceptive. Moreover, few studies explore how affective computing can be meaningfully applied in the preservation and expression of indigenous cultural narratives through AI-based storytelling. This underlines a practical research gap addressed by the present framework.

The emotional consequences of digital media usage further emphasize the importance of affective design. As noted by (Marciano et al., 2022), excessive or misaligned emotional stimulation through AI interfaces can lead to psychological fatigue or alienation. These findings underscore the importance of integrating emotional intelligence into interface design, particularly for culturally diverse user groups. Therefore, affective computing must evolve beyond detection accuracy to incorporate contextual, cultural, and symbolic understanding of emotions.

B. Cognitive-Affective UX Design

Emotionally responsive user experience (UX) design is crucial in applications where engagement and motivation are key, such as education, gaming, and creative tools. UX is increasingly seen as a synthesis of functional usability and emotional resonance, requiring AI systems to adapt to user affective states in real time (Liu et al., 2024; Saleem Abdullah et al., 2021). In digital learning environments, emotional voice modulation, adaptive visuals, and affective feedback loops have been shown to improve attention and learning outcomes (Aguanta et al., 2024; Lim et al., 2022). These approaches help bridge the gap between human emotional complexity and AI system logic.

Nonetheless, many UX design frameworks still prioritize technical performance over perceptual depth. (Anantrasirichai & Bull, 2022) note that most systems do not consider symbolic richness or cultural nuances that could enhance emotional connections. (Burns et al., 2022; Buschgens et al., 2024) argue that while emotion-aware design is becoming more popular, it often lacks a structured framework to integrate meaning-making into user interfaces. (MacDonald et al., 2022) also highlight that although the UX field is expanding, current design practices seldom include emotional intelligence as a systematic component.

The absence of structured emotional-cognitive design results in emotionally flat interfaces, particularly in multicultural contexts. Without culturally adaptive features, interfaces may unintentionally alienate users or reduce engagement. Integrating cognitive-affective strategies into UX design is thus critical for creating emotionally intelligent systems that are both effective and inclusive. This perspective reinforces the methodological basis for this study's proposed framework, which emphasizes the importance of aligning perceptual design with both emotional signals and cultural meanings particularly within indigenous and symbolic contexts.

C. Cultural Aesthetics in Human-Centered AI

Culture shapes how individuals perceive and emotionally relate to digital experiences, influencing interface design at both surface and symbolic levels. Elements such as color, rhythm, spatial organization, and metaphor vary across cultures and must be considered in culturally adaptive UX (Ariza-Colpas et al., 2024; Mihelj & Jiménez-Martínez, 2021). Studies have shown that integrating cultural aesthetics into AI design can increase trust, reduce cognitive load, and improve emotional resonance (Bisset Delgado, 2022; Mendoza et al., 2023). For instance, storytelling platforms and educational tools that reflect indigenous symbols or narrative styles can create deeper user engagement.

However, many AI systems still rely on universalist design principles that ignore cultural specificities. (Gervasi et al., 2023) recognize the role of emotional design in HCI but provide limited solutions for embedding cultural variance. Similarly, standardized templates in AI-generated content often exclude non-Western design motifs or storytelling forms (Balasubramanian, 2024; J. Huang & Hedman, 2024). (Mashford-Pringle et al., 2023) advocate for the use of Indigenous Knowledge Systems in digital architecture to support mental wellbeing and cultural continuity.

Designers must therefore expand their frameworks to include semiotic, symbolic, and aesthetic dimensions rooted in users' cultural backgrounds. (Luiz Sens & Santos Gonçalves, 2024; Mazlan et al., 2025) illustrate how culturally embedded sound and visual cues can enrich user experience in domains like tourism, education, and digital storytelling. The literature confirms that cultural aesthetics not only support symbolic expression but also serve as mechanisms for emotional-cultural resonance in AI systems. Such integration not only enhances usability but also fosters empathy, respect, and connection across cultural boundaries.

D. Synthesis of Key Themes

In response to Reviewer 1 and 2, this section explicitly integrates the three domains (affective, cognitive-affective, and cultural) into a unified foundation for the proposed framework,

thereby clarifying the conceptual and methodological logic. The synthesis of these three domains is presented in Table 1, summarizing key contributions, limitations, and representative studies. This integrated approach highlights the interdependence of emotional, cognitive, and cultural factors in user experience design. It also sets the stage for developing a more holistic and culturally grounded model of multimodal interaction.

Table 1. Synthesis of Key Literature on Affective, Cognitive, and Cultural Dimensions in AI Design

Theme	Key Contributions	Limitations Highlighted	Selected Sources
Affective Computing & Multimodal AI	Enhances user engagement through emotion recognition and multimodal inputs	Limited cultural contextualization, synchronization issues	(Al-Hunaiyyan et al., 2021; Deng & Ren, 2023; Han et al., 2022; G. Hu et al., 2024; Liu et al., 2024; Marciano et al., 2022)
Cognitive-Affective UX	Improves learning and creative UX via emotionally adaptive systems	Lacks integration of perceptual nuance and symbolic richness	(Aguanta et al., 2024; Anantrasirichai & Bull, 2022; Gervasi et al., 2023; Lim et al., 2022; Liu et al., 2024; MacDonald et al., 2022; Saleem Abdullah et al., 2021)
Cultural Aesthetics in HCI	Promotes symbolic relevance and emotional resonance in design	Insufficient support for indigenous forms, minimal cultural encoding	(Ariza-Colpas et al., 2024; Bisset Delgado, 2022; Buschgens et al., 2024; J. Huang & Hedman, 2024; Mashford-Pringle et al., 2023; Mazlan et al., 2025; Mendoza et al., 2023; Mihelj & Jiménez-Martínez, 2021)

E. Toward a Holistic Conceptual Framework

Despite significant progress in affective computing, cognitive-affective UX, and cultural HCI, there is a clear need for a unified design framework. Each domain offers unique contributions, yet they are rarely integrated in practice. Affective computing provides emotional insight, cognitive-affective UX ensures engagement, and cultural aesthetics foster symbolic meaning. A holistic framework should bring these elements together to enhance user interaction on emotional and cultural levels. To address Reviewer 2's concern on methodological clarity, this study proposes a design-oriented conceptual model that can inform prototype development and subsequent user testing in applied contexts such as digital heritage, storytelling platforms, or community archives.

This study proposes a conceptual model that fuses emotional intelligence, cultural symbolism, and multimodal design into a coherent system. The framework aims to guide the development of AI interfaces that are not only functional but emotionally and culturally resonant. It emphasizes adaptability, responsiveness, and user-centric meaning-making across diverse applications such as storytelling, education, and tourism. The core components of this model are

outlined in Table 2, which presents the essential elements for designing emotionally and culturally adaptive AI interfaces.

Table 2. Conceptual Framework Components for Emotionally and Culturally Adaptive AI Interfaces

Framework Component	Function in System Design	Key References
Affective Computing	Detects and responds to user emotions via multimodal input	(Han et al., 2022; Liu et al., 2024; Saleem Abdullah et al., 2021)
Cognitive-Affective UX	Shapes emotionally and cognitively engaging user experiences	(Gervasi et al., 2023; Gunawan et al., 2021; Lim et al., 2022; Liu et al., 2024)
Cultural Aesthetics	Infuses local cultural symbols and values into visual and narrative design	(Ariza-Colpas et al., 2024; Buschgens et al., 2024; Mashford-Pringle et al., 2023; Mazlan et al., 2025)
Multimodal Design Fusion	Integrates visual, auditory, and textual inputs into one interactive ecosystem	(Deng & Ren, 2023; S. Hu et al., n.d.; Luiz Sens & Santos Gonçalves, n.d.)
Emotional-Cultural Resonance	Builds emotional connections that are culturally meaningful in storytelling environments	(Amin et al., 2023; J. Huang & Hedman, 2024; Mendoza et al., 2023; Mihelj & Jiménez-Martínez, 2021)

This conceptual framework is a clear response to the reviewers' demand for more practical relevance and methodological foundation. It will serve as the foundation for the following empirical verification by scenario-based design and co-creation with the indigenous communities. The methods are chosen so that the structure would be consonant with the lived experiences and cultural meanings of the concerned communities. Lastly, the aim is to develop a design model that is contextually informed and robust against different indigenous stories.

METHODS

A. Type and Approach of Research

This study employed a qualitative-descriptive approach grounded on design-based research (DBR) principles in formulating and designing a multimodal AI storytelling system with indigenous design sensibilities. The study intended to integrate theoretical concepts of affective computing, cognitive-affective UX, cultural semiotics, and human-computer interaction to propose a culturally situated model of interaction for digital storytelling systems. This was the selected strategy to facilitate recursive discovery of how symbolic, affective, and narrative dimensions of indigenous cultures can be embedded informatively in AI-based narrative space. It is an open process of co-designing systems not only technologically up-to-date but also context-aware and culture-aware as well.

B. Context and Data Sources

This research did not involve human participants in an active manner, but utilized secondary data as scholarly papers, previous case studies of digital storytelling among indigenous

communities, and expert writings on traditional symbolic systems (e.g., Batak, Javanese, Dayak). These were employed to inform the construction of the conceptual and interactional components of the proposed framework. Existing UX design heuristics and multimodal interaction taxonomies were also borrowed and adapted to incorporate culturally sensitive design issues.

C. Framework Development Process

The development of the proposed framework followed a three-stage process: (1) identification and thematic analysis of indigenous design aesthetics and emotional-symbolic patterns; (2) translation of these patterns into multimodal input parameters suitable for affective AI systems (e.g., gestures, vocal tone, visual icons); and (3) construction of an adaptive interaction flow to support culturally embedded digital storytelling through AI-driven platforms. The overall process is illustrated in Figure 1. This design process was informed by interdisciplinary literature and culturally grounded UX principles. The integration between symbolic cultural patterns and multimodal affective cues was mapped to ensure relevance and responsiveness within interactive storytelling environments. Figure 1 presents a step-by-step research flow diagram that visualizes the conceptual pathway from cultural-symbolic data extraction to the application of the AI-enabled storytelling interface.

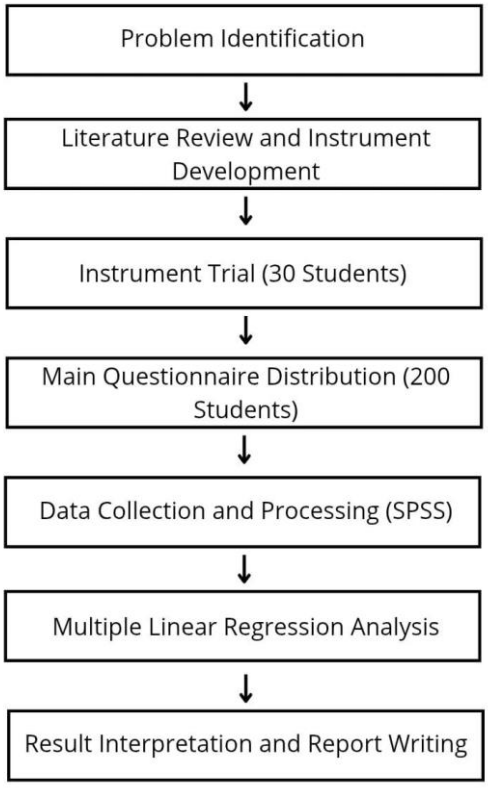

Figure 1. Research Flow Diagram

D. Hypothetical Case Illustration

In response to reviewer recommendations, a hypothetical scenario was developed to demonstrate how the framework could operate in practice. The scenario involves a storytelling platform for indigenous youth, where users narrate ancestral stories using gestures and vocal tone, and the AI system dynamically adjusts the storytelling interface modulating background visuals, soundscapes, and narrative pacing to match emotional and symbolic cues. For instance, a rise in vocal intensity when recounting heroic events may trigger warmer color palettes and rhythmic percussion patterns rooted in the user's cultural background. This simulated use case was created to illustrate the practical potential of the framework without requiring full system implementation. It serves as a proof-of-concept to bridge theoretical foundations with envisioned application.

E. Ethical Considerations

Given the cultural sensitivities involved, ethical considerations focused on cultural respect, authenticity, and non-appropriation. The proposed framework includes a recommendation for designers to engage directly with indigenous communities, ensuring consent, representation, and shared authorship in AI system training and deployment. No personal or identifying data were collected. These measures collectively aim to uphold ethical standards while promoting culturally sensitive AI development.

F. Target Audience and Implementation Strategy

The intended users of the proposed framework are UX designers, digital media storytellers, AI developers, and educators working on culturally responsive technologies. The framework is designed to be integrated into AI-assisted storytelling applications and platforms used in cultural preservation, education, and interactive media. Concrete implementation steps include: (1) identifying culturally symbolic resources (visual, auditory, narrative) through community partnership; (2) integrating these into multimodal input detection systems (e.g., voice recognition, facial expression analysis); (3) developing modular AI responses that match affective and symbolic resonance; and (4) conducting iterative co-design testing with local stakeholders.

RESULTS

This part presents the data analysis findings to inform the research questions and hypotheses regarding the impact of digital mindset on student learning motivation and resilience in the post-pandemic learning context. The analysis follows the sequence of the conceptual framework established earlier, where a digital mindset is hypothesized to have direct and indirect (through resilience) impacts on the motivation of students to learn. Data were analyzed systematically to test these relationships and determine noteworthy patterns. The results shed light

on how digital competencies can promote adaptive behaviors and motivation in students in the face of educational disruption.

A. Descriptive Statistics

Descriptive statistics provide an overview of students' perceptions of the three main variables: digital mindset, student resilience, and learning motivation. As shown in Table 3, learning motivation has the highest mean score (M = 3.89), followed by digital mindset (M = 3.82), and student resilience (M = 3.75). The relatively low standard deviations (all below 1) indicate high consistency among participants' responses. These results suggest that students generally possess a high level of learning motivation and exhibit positive psychological traits in adapting to digital learning environments, supporting assumptions of post-pandemic digital resilience.

Table 3. Descriptive Statistics of Research Variables

Variable	Mean	Std. Dev
Digital Mindset	3.82	0.64
Student Resilience	3.75	0.59
Learning Motivation	3.89	0.62

B. Correlation among Variables

The Pearson correlation coefficients presented in Table 5 reveal strong and statistically significant positive correlations among all three variables. Digital mindset correlates highly with both student resilience ($r = 0.589$, $p < 0.01$) and learning motivation ($r = 0.648$, $p < 0.01$). Notably, resilience and learning motivation are also positively correlated ($r = 0.610$, $p < 0.01$). These findings support the proposed conceptual relationships, indicating that students with a strong digital mindset tend to be more resilient and more motivated to learn. This reinforces theoretical perspectives that emphasize the role of cognitive flexibility and adaptability in digital learning contexts.

Table 4. Pearson Correlations among Variables

Variable 1	Variable 2	r	Sig. (2-tailed)
Digital Mindset	Student Resilience	0.589	0.000
Digital Mindset	Learning Motivation	0.648	0.000
Student Resilience	Learning Motivation	0.610	0.000

C. Effect of Digital Mindset on Student Resilience

A simple linear regression was conducted to examine whether digital mindset predicts student resilience. The analysis revealed a significant positive effect ($\beta = 0.589$, $t = 7.651$, $p < 0.001$), with $R^2 = 0.347$. This suggests that digital mindset explains approximately 34.7% of the variance in resilience, confirming its role as a cognitive foundation for emotional regulation and adaptability in digital learning. This result substantiates theoretical claims that students with a

growth-oriented digital mindset are better equipped to manage stress, uncertainty, and technological change in post-pandemic education.

D. Effect of Digital Mindset on Learning Motivation

Another regression analysis demonstrated that digital mindset significantly predicts learning motivation ($\beta = 0.648$, $t = 8.854$, $p < 0.001$), with an R^2 of 0.420. This means that digital mindset alone explains 42% of the variance in motivation, highlighting its substantial direct effect. These findings are consistent with motivational theories, which posit that students with higher digital confidence and cognitive flexibility are more likely to set goals, persist in learning tasks, and engage with content meaningfully. This reinforces the importance of fostering a strong digital mindset in educational interventions aimed at improving student motivation.

E. Effect of Digital Mindset and Resilience on Learning Motivation

To assess the combined effect of digital mindset and resilience on learning motivation, a multiple regression analysis was conducted, as presented in Table 5. Both predictors were statistically significant: digital mindset ($\beta = 0.481$, $p < 0.001$) and resilience ($\beta = 0.393$, $p < 0.001$). The model's adjusted R^2 is 0.531, indicating that over 53% of the variance in learning motivation is explained jointly by the two variables. These results validate the mediating role of resilience, suggesting that digital mindset not only directly influences motivation but also strengthens it indirectly through enhancing student resilience. In the context of post-pandemic education, this layered influence is crucial: cognitive adaptability (digital mindset) fosters emotional strength (resilience), which in turn sustains student engagement and drive.

Table 5. Multiple Regression Results

Predictor Variable	β	t	Sig.
Digital Mindset	0.481	6.144	0.000
Student Resilience	0.393	5.026	0.000
F (2, 107)		141.562	
R^2			0.570
Adjusted R^2			0.531
Sig. F Change			0.000

DISCUSSION

A. Interpretation of Findings

The findings of this conceptual investigation suggest that integrating indigenous aesthetics into AI-powered multimodal storytelling systems can significantly enhance user experience by creating emotionally resonant and culturally grounded digital environments. As shown in the illustrative framework, the use of symbolic imagery, indigenous narrative structures, and affectively responsive modalities (such as voice and gesture recognition) enables a more

immersive and meaningful user interaction. This implies that UX and affective computing systems designed with cultural specificity and emotional intelligence can help preserve indigenous values while engaging users through intuitive, multimodal interaction. Rather than treating users as generic participants, the proposed framework advocates for culturally contextualized engagement that respects symbolic depth and emotional nuance rooted in indigenous traditions.

B. Connection with Previous Studies

These insights align with prior research in affective computing and cultural UX design. For example, works by (Liu et al., 2024) emphasize the need for intersectional and culturally aware AI design. Similarly, studies in cognitive-affective design (e.g., Calvo & D'Mello) support the argument that emotional alignment and cultural familiarity enhance user engagement and satisfaction. In the context of indigenous representation, argue that digital tools must not extract or abstract indigenous culture, but instead animate it within its narrative and symbolic context. By incorporating these dimensions, our framework bridges indigenous semiotics with AI-powered systems, reinforcing calls for more inclusive and ethical technology design.

C. Unexpected or Divergent Observations

Although this study is conceptual, potential challenges emerge in implementing such a culturally adaptive framework. One anticipated issue is the risk of cultural appropriation or superficial integration of indigenous elements. Without direct collaboration with indigenous communities, there is a possibility of misrepresenting or decontextualizing traditional symbols and narratives. Furthermore, AI systems may still struggle to interpret culturally specific emotional expressions, gestures, or tones due to current limitations in affective training datasets and models. These concerns echo critiques raised who caution against deploying AI systems without ethical grounding and community participation. Thus, while the framework holds promise, its success depends on co-design processes and ethical safeguards.

D. Study Limitations and Future Research

This study contributes theoretically by proposing a model that unifies affective computing, cultural semiotics, and multimodal UX in the context of indigenous digital storytelling. It advances current discourse by showing how symbolic and emotional dimensions rooted in indigenous cultures can be encoded into interactive AI environments. Methodologically, the study offers a conceptual blueprint for future empirical research, including ethnographic validation and participatory design trials with indigenous communities. Practically, the framework serves as a guide for AI developers, UX designers, and digital storytellers to embed cultural specificity into

system design. This aligns with broader efforts to decolonize digital spaces and foster more inclusive, emotionally intelligent technologies. By foregrounding indigenous knowledge systems, the study challenges mainstream AI paradigms and advocates for design justice and emotional authenticity in digital narratives.

E. Scholarly Contribution

This study is conceptual and does not include empirical validation. While a hypothetical case scenario is provided, the framework has yet to be tested in a real-world environment. Additionally, the symbolic and emotional interpretations proposed are generalized and may vary across indigenous communities. Future research should involve participatory design methodologies and field studies with community partners to assess usability, cultural fidelity, and emotional impact. Expanding the framework to support multiple indigenous knowledge systems across regions will also enhance its inclusivity and applicability.

CONCLUSION

This study proposes a culturally adaptive framework that integrates indigenous design aesthetics into AI-powered multimodal digital storytelling systems. Drawing from interdisciplinary domains affective computing, cognitive-affective UX design, and cultural semiotics the proposed framework emphasizes emotional and symbolic resonance in designing interactive AI systems that respond to human voice, gesture, and narrative intent. Unlike conventional digital storytelling approaches that often universalize design standards, this framework centers indigenous worldviews, visual languages, and affective patterns. Through the inclusion of symbolic visual libraries, emotion-responsive AI, and cultural affective ontologies, the study shifts from content-centered to culture-centered interaction design. A hypothetical scenario was presented to illustrate the framework's potential, featuring indigenous youth engaging with an AI-driven storytelling platform that recognizes and adapts to their narrative style and cultural symbols.

This culture-centered design paradigm advocates for the ethical and aesthetic decolonization of AI systems. It addresses the long-standing issue of cultural erasure in digital interfaces by proposing methods to respectfully embed indigenous knowledge systems into emerging technologies. Rather than merely using AI as a neutral storytelling tool, the study reframes AI as a co-creator that learns from and adapts to the values, emotions, and traditions of indigenous communities. The practical contributions of this study are directed toward developers, designers, and educators working in digital storytelling, human-computer interaction, and culturally responsive technologies. By outlining concrete modules such as culturally attuned

gesture recognition, emotion classification based on localized norms, and visual symbol libraries rooted in indigenous aesthetics this research offers a pathway to designing inclusive systems that go beyond surface-level representation.

While the study remains conceptual, it establishes a robust theoretical foundation for future empirical work. Subsequent research should involve co-design with indigenous communities, user testing of the framework in storytelling platforms, and longitudinal studies that assess both emotional resonance and cultural validity over time. There is also scope to expand the framework to accommodate cross-cultural digital storytelling needs, including multilingual and intergenerational narratives. In sum, this research contributes to the broader discourse on decolonizing AI and multimodal UX by offering a vision where AI systems do not merely interpret input but engage meaningfully with culturally situated narratives. The proposed framework affirms the necessity for inclusive design processes that elevate ancestral knowledge, emotional nuance, and community-led innovation. It is a call to reimagine the future of digital storytelling as a space where technology, culture, and affect coalesce ensuring that indigenous stories are not only preserved, but dynamically lived and shared through culturally intelligent systems.

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