

ole_of_Sensory_and_Emotional_Design_in_E-Learning_Narratives.pdf

by Roy Anthonius Susanto

Submission date: 28-Oct-2026 10:44AM (UTC+0700)

Submission ID: 3072927061

File name: ole_of_Sensory_and_Emotional_Design_in_E-Learning_Narratives.pdf (1.76M)

Word count: 7897

Character count: 46696

CRAFTING EXPERIENCE: THE ROLE OF SENSORY AND EMOTIONAL DESIGN IN E-LEARNING NARRATIVES

Roy Anthonius Susanto¹
Christian Orvin Widodo²

Received Jan. 25, 2026; Revised Apr. 18, 2026; Accepted May. 07, 2026.

Abstract: While digital storytelling tools increasingly incorporate sensory and emotional design elements, the effectiveness of these elements in an experiential learning environment remains less clear and needs to be explored further. This research enhances the investigation of this topic through a qualitative multiple case study of three platforms: Gentlerain.ai, The Blue Desert, and Expo 58 Virtual Pavilion. These platforms were chosen for their story-driven e-learning features and emphasis on narrative frameworks. Data were produced by conducting a series of methodical UI/UX walkthroughs and observing the primary platforms. Each instance was evaluated based on a framework that included narrative composition, sensory details, emotional connection, interaction design, consistency with Kolb's experiential learning cycle, and management of cognitive load. The findings indicate that visual design serves as a primary element but not yet standardized across platforms. While it serves as a medium to direct attention, emotional and argumentative burdens can sometimes reduce the engagement effectiveness. Tactile interactivity, in contrast, was not strongly associated with affective engagement; for example, The Blue Desert evoked emotional responses despite minimal tactile interaction. Cross-case comparisons further illustrate that narrative structure is fundamental for sustaining overall engagement with design attention and impact, thereby influencing the learning outcomes achievable through Kolb's experiential learning cycle. This research presents the Narrative Sensory Experiential Learning Model along with a design checklist for designers. This contribution is framed not only in relation to the model itself but also concerning the cross-case process that demonstrates the value of qualitative and structured analysis of digital platforms. Such an approach serves as a pathway for translating design-focused theoretical insights into Visual Communication Design and digital education, contributing toward Sustainable Development Goal 4.

Keywords: digital storytelling; experiential learning; sensory design; emotional design; visual communication design; e-learning

¹Roy Anthonius Susanto is a lecturer at The Faculty of Art and Design Universitas Multimedia Nusantara (UMN) Tangerang.

e-mail : roy.as@umn.ac.id

²Christian Orvin Widodo is a staff at Politeknik Multimedia Nusantara Tangerang.

e-mail: christian.orvin@mpn.ac.id

Introduction

Digital storytelling emerges as an increasingly relevant practice in education today, combining storytelling structures with various multimedia and interactive technologies to promote student involvement and knowledge formation (Smeda et al., 2014; Tamimi, 2024). By this method, the learning is no longer delivered passively but becomes immersive as active engagement is developed which reflects through reflection and critical thought (Yang & Wu, 2012). Moreover, some researches show that integrating a visual, an auditory, and an interactive factor can enhance learners' motivation and their learning, especially in digital learning environments (Smeda et al., 2014; Tamimi, 2024; Yang & Wu, 2012).

In recent times, digital storytelling has become a lot more than a traditional media presentation but rather engaging experiences consisting of emotional involvement, multisensory interaction, and narrative-based learning contexts (He, 2024; Susanto, 2023). The above developments align with experiential learning theory, which emphasizes the process and progression of learning through experience, reflection, conceptualization and experimentation (Susanto, 2023). Immersive storytelling, when utilized by explorers, renders them active participants, rather than passive recipients, connecting emotionally and cognitively to the material being learned (Robin, 2016). In such immersive learning experiences, sensory design is crucial (Wu et al., 2023). Multisensory aspects of visual aesthetics, sound design, interactive interfaces, and other facets of user engagement can impact the way we learn (Santi et al., 2024; Wu et al., 2023). Equally, emotional design improves motivation and retention, as providing meaningful learning experiences encourages linking of learners with content at cognitive and affective dimensions (He, 2024). Multi-

sensory participation (e.g., using visual, auditory, and tactile) enhances attention, emotional engagement, and cognitive functioning, increasing attentional capacity and increasing the learners' cognitive function with this multimodal approach (Schifferstein, 2011; Wu et al., 2023). Visual cues favour spatial comprehension and information processing (Wu et al., 2023), auditory cues increase emotional involvement and attention (He, 2024; Wu et al., 2023), while tactile interaction facilitates active participation and experiential learning (Susanto, 2023; Wu et al., 2023). The properties of these sensorial stimuli in digital learning environments are depicted in Table 1 (Wu et al., 2023).

Table 1. Sensory characteristic
(Source: Wu et al., 2023)

Characteristics	Vision Sensor	Auditory Sensor	Tactile Sensor
Expression dimension diversity	Extremely high	General	Singular
Reaction time of attention	Relatively slow	Rapid	Extremely responsive
Time change sensitivity	Insensitive	High sensitivity	Low sensitivity
Perceived range size	Limited range, strongly related to visual field range	360° omnidirectional spatial perception	Limited range, strongly related to visual field range
Expression of emotional changes	Difficult to express emotional changes	Easy to express emotional changes	Inability to express emotional changes
Spatial positioning accuracy	High accuracy	Low accuracy	Low accuracy
Multiple concurrent interference intensity	Weak interference	Strong interference	Strong interference
Environmental relevance	Weak correlation	Strong correlation	Weak correlation

No single sensory modality offers immersive learning experiences, as evidenced in Table 1 (Wu et al., 2023). Instead, multi-sensory input increases engagement and retention of knowledge (Wu et al., 2023). And according to such learning theories (Susanto, 2023), it is based on the multisensory approach that promotes active experience and reflective learning. In addition, emotional design (which is more important than sensory engagement) is also crucial in the digital storytelling context (He, 2024; Schifferstein, 2011). Emotional design creates motivation, empathy, and learner engagement (He, 2024; Robin, 2016) by providing meaningful learning experiences. Multisensory use together with emotional design can enhance experiential learning by integrating cognitive and affective processes (Susanto, 2023; Wu et al., 2023). In Table 2, sensory and emotional design attributes for immersive e-learning environments are compared.

Table 2. Multisensory Approach

Aspect	Sensory Design	Emotional Design
Focus	Multi-sensory engagement (sight, sound, touch, etc.	Evoking positive emotions to enhance motivation and learning
Techniques	Multimodal interaction, sensory exploration, immersive environments	Positive emotional design, user-centric design, gamification, personalized feedback
Impact on Learning	Enhances immersion and engagement, improves learning performance	Increases motivation, reduces stress, improves learning outcomes and user satisfaction
Examples	Collaborative virtual environments, sensory data integration in multimedia	Emotionally designed materials, tailored feedback systems, gamified learning tasks

Sensory design is concerned with multi-modal involvement, while emotional design concerns motivation and affective learning (Table 2). With those, and in conjunction with digital tech tools or gamut devices, it has become an option to develop immersive digital learning environments that are designed in a way that is exactly what experiential learning does in practice. However, with much interest in digital storytelling, there is a lack of research that explores their co-embedding in narrative-based e-learning environments even as the landscape of immersive technologies, such as artificial intelligence (AI), interactive storytelling platforms, and virtual environments, has expanded rapidly (Doumanis et al., 2018). This gap indicates one might wish to make cross-case comparisons or frameworks that lead us towards instructional designers. Filling this research gap, the current paper investigates the role and suitability of sensory and emotional design in experiential learning through digital storytelling platforms. It uses Kolb's experiential learning theory as a theoretical basis and defines three platforms with immersive storytelling and multi-sensory interaction: Gentlerain.ai, The Blue Desert, and Expo 58 Virtual Pavilion (Susanto, 2023). The objectives of this study are:

1. Explore the ways in which sensory and emotional design aspects play out in digital storytelling spaces
2. To examine how these components facilitate experiential learning as defined by Kolb's model of learning
3. Design patterns that improve user engagement and comprehension. Using Visual Communication Design, experiential learning theory and multisensory storytelling, this paper contributes to the existing literature related to immersive digital learning contexts (Susanto, 2023; Wu et al., 2023).

These results provide theoretical and

practical implications for instructional designers, educators, and those in the field of digital media to improve engagement and influence the creation of purposeful experiences designed, relevant, and meaningful (Smeda et al., 2014). The study therefore contributes to the literature on Visual Communication Design and digital learning by examining cross-case data on sensory and emotional design of digital storytelling environments. It also defines a Narrative Sensory Experiential Learning Model and a checklist of best practices for design for educators and designers of visual communication experiences to assist project designers of e-learning experiences with new learning.

Methodology

The design approach for this research was based on a qualitative multiple case study. The researchers aimed to investigate the impact of design-oriented aspects of sensory and emotional design on experiential learning within digital storytelling spaces. An engaging qualitative design was selected to provide intensive insights into visual communication strategies, as well as the ways in which narrative construction and multisensory interactions occur across real-world digital learning platforms.

Research was undertaken in accordance with Visual Communication Design principles and Kolb's Experiential Learning Theory, which emphasizes that learning occurs through concrete experience, reflective observation, abstract conceptualization, and active experimentation. Based on this theoretical framework, the case study selection guided the analysis. The methodology aided cross-case comparisons, emphasizing recurrent design trends, commonalities, and differences between sensory and emotional storytelling strategies across several e-learning environments. The purpose of these ob-

servations was to capture, in detail, how the design of visual communication could increase affective involvement and cognitive processing in various online educational settings (Sahraie et al., 2024).

Purposive sampling was used to three case studies. We selected the following case based on the following criteria:

Table 3. Case Selection Criteria

Criteria	Description	Selected Case Studies
Narrative-based learning	Platform uses storytelling as primary learning approach	1. Gentlerain.ai (Interactive workplace simulation) 2. The Blue Desert (Climate storytelling experience) 3. Expo 58 Virtual Pavilion (Immersive historical learning environment)
Multisensory interaction	Platform includes at least two sensory modalities (visual, auditory, tactile/UI)	
Educational purpose	Platform designed for learning or knowledge transfer	
Accessibility	Platform publicly accessible for observation	
Innovation	Platform demonstrates innovative storytelling design	

All of these platforms reflect various narrative approaches and multisensory strategies in the digital learning process.

Data Collection Method

Data were collected through systematic observation of the interface, features, and user experience of each platform and analysis of the content narrative struc-

tures, aspects of visualization, and interactive features (Patiño et al., 2023). This was complemented by observational data on multimedia components, such as photographs, video, audio, and virtual reality captures (leBrasseur, 2023), textual elements, and user interface/animations to analyze how these design elements enable sensory engagement and emotional within the context of digital storytelling.

Data Analysis Procedure

Data were analyzed using a thematic coding approach. Observational data, screenshots, and documentation were coded based on categories through an evaluation rubric, including narrative structure, sensory design, emotional engagement, and experiential learning alignment. Patterns were identified within each case and then compared across cases to identify similarities and differences.

A cross-case synthesis was used to develop design patterns that form the basis of the proposed model. This analytical process ensured systematic interpretation and strengthened the validity of the findings.

Structured UI/UX Walkthrough

The qualitatively rich exploration of the digital interfaces of the educational environments was used to decompose in an obvious manner (Sahraie et al., 2024), following a step-by-step guideline for UI/UX walkthroughs, ensuring triangulation and a methodological robustness to the evaluation process. This approach allows me to do so while critically reflecting on the potential of sensory and emotional design to give the experience of experiential learning aligned with Kolb's cycle (Susanto, 2023). Key components included:

1. Navigation structure analysis for

mapping user flow and uncovering obstacles to immersion

2. Interaction design observation to explore multimodal affordances and user agency (Wu et al., 2023)

3. Sensory design identification, encompassing visual, auditory, and tactile stimuli for multisensory engagement (Schifferstein, 2011; Wu et al., 2023)

4. Narrative flow mapping to track narrative structure and emotional arcs (Robin, 2016)

5. Emotional engagement assessment via design cues that evoke motivation, affective responses, and retention (He, 2024)

Screenshots, video recordings, and detailed observational notes during each session were documented for cross-case comparison and thematic coding for validity (Sahraie et al., 2024). This method of documentation helped us give a good representation of all design elements in a comprehensive manner, thereby allowing a rounded record of the qualitative approach for the future quantitative study.

Direct Platform Observation

The researcher performed repeated direct observation on each platform for several hours (2-3 hours per platform) and entered the natural flow of usage to make systematic work of identifying:

1. Progression of narrative and immersive imagery
2. Sensory interaction elements such as multimodal cues (e.g., auditory, subtle animations)(Schifferstein, 2011; Wu et al., 2023)
3. Cues of emotional design (affective visuals and motivational feedback loops) (He, 2024)

4. Features of learning engagement (participatory branching, reflective pauses), followed Kolb's cycle (Susanto, 2023)

These insights prompted us to view design components as levers of experiential learning through tangible experiences, emotional connections and active participation, as well as effects on user experience, motivation and cognition (Robin, 2016; Sahraie et al., 2024). Detailed field notes, screenshots and video clips were collected to analyse thematically and triangulate with UI/UX walkthroughs, allowing for methodological rigour (Sahraie et al., 2024). This process entailed not only dealing directly with such sources as documentation of the platform and developer statements available to the outside world but also using data to interpret design choices made based on observation; where the justification for platform design was presumably implicit.

Supporting content, including platform descriptions, developer documentation, published articles, technical whitepapers, user manuals, and interaction logs were systematically reviewed, focusing on design rationales, intended educational objectives, and user experiences. Supporting the UI/UX walkthroughs and observations to triangulate collected data with other study tools through qualitative document analysis that was able to strengthen the methodological rigor, validity, and reliability when attempting to uncover sensory and emotional design patterns, in accordance with Kolb's experiential learning cycle (Lorenz et al., 2025; Sahraie et al., 2024; Susanto, 2023). Primary material was official platform websites, (Baceviciute et al., 2021; Robin, 2016).

Evaluation Rubric

The case studies were scored on a rubric based on experiential learning and sensory-emotional design principles.

Each dimension was graded on a three-point scale: Ratings were determined by the researcher based on accumulated evidence obtained through UI/UX walkthroughs, observational notes, and document analysis, and cross-referenced with documented design features.

Table 4. Evaluation Rubric

Dimension	Indicators	Indicator	Rating Scale
Narrative Structure	Story clarity, learner role, narrative progression	Story clarity, learner role, narrative progression	Low: No clear story arc or learner positioning; Moderate: Narrative present but fragmented; High: Coherent story with learner as active agent
Sensory Design	Visual, auditory, tactile integration	Visual, auditory, tactile integration	Low: Single modality; Moderate: Two modalities, loosely coordinated; High: Three modalities, purposefully aligned with learning goals
Emotional Engagement	Emotional cues, empathy, immersion	Emotional cues, empathy, immersion	Low: Neutral or absent affective design; Moderate: Emotional cues present but

			surface-level; High: Sustained emotional arc tied to content meaning
Kolb Alignment	Experience, reflection, conceptualization, experimentation	Experience, reflection, conceptualization, experimentation	Low: Supports one stage only; Moderate: Two to three stages addressed; High: All four stages accessible through design
Interaction Design	User control, branching decisions, feedback	User control, branching decisions, feedback	Low: Passive or linear only; Moderate: Some user control, limited feedback; High: Meaningful agency with responsive feedback loops
Cognitive Load	Pacing, segmentation, usability clarity	Pacing, segmentation, usability clarity	Low: Overwhelming or unclear interface; Moderate:
			Manageable but inconsistent pacing; High: Well-segmented, with pacing mechanisms that prevent overload

Validity & Reliability

To optimize methodological rigor, validity, and reliability, this study triangulated data from three complementary qualitative methods: structured UI/UX walkthroughs for an in-depth interface analysis (Sahraie et al., 2024); direct platform observations using field notes, screenshots, and video recording to capture natural user flows (Lorenz et al., 2025; Sahraie et al., 2024); and a document review of developer documents, whitepapers, and related publications for contextual verification (Lorenz et al., 2025; Sahraie et al., 2024). Cross-case comparisons among Gentlerain.ai, The Blue Desert, and Expo 58 Virtual Pavilion also confirmed insights emerging through commonalities in sensory-emotional design and coherence with Kolb’s experiential learning (Robin, 2016; Susanto, 2023). Development documentation and published platform evaluations were used to corroborate observed design rationales (Lorenz et al., 2025) and data were rigorously documented with case selection criteria, evaluation rubric, data collection protocols and thematic coding processes per sensory, emotional and Kolb cycle principles (He, 2024; Susanto, 2023) leading to transparency, reproducibility and trustworthiness.

Case Studies

Three digital storytelling platforms have been chosen based on their narrative-based learning, multisensory engagement, and experiential interaction. The platforms are chosen based on storytelling approaches and learning contexts: workplace simulation, environmental storytelling, and historical immersive learning. This comparative framework provides a means to explore sensory and emotional design features that support experiential learning as part of this research. Platforms such as Gentlerain.

ai, The Blue Desert and Expo 58 Virtual Pavilion were selected, since they offered unique methods of pedagogical application of immersive technology as well as narrative framing (Kee et al., 2023; Recke & Perna, 2021). They assess the extent to which these sites facilitate embodied knowledge and attitudinal change via 360° VR storytelling and multimodal engagement (Lin et al., 2025; Palmieri et al., 2025), aligned with the existing literature that outlines immersive educational technologies (Lin et al., 2025; Palmieri et al., 2025).

Case Study 1: Gentlerain.ai (Interactive Workplace Simulation)

Gentlerain.ai (www.gentlerain.ai) is an interactive digital learning platform designed to simulate workplace scenarios through narrative-driven experiences. The platform integrates artificial intelligence, branching dialogue, and interactive storytelling to support experiential learning in professional training contexts. Users engage with workplace challenges such as leadership communication, conflict resolution, and decision-making. This type of platform focuses on learner participation through dialogue and scenario-based decision-making. With every reaction, users are led through different ways to respond from the basis of an experiential learning environment for reflection and skills. The interface is modern in terms of visual design, interactive UI elements, and feedback that is created to guide the learners through narrative. Key Features: Decision-based interactive storytelling, AI-driven branching dialogue, Scenario-based workplace simulation and interactive feedback mechanisms.

These features of simulated professional environments present the learner as being players in the professional environment.



Figure 1. Gentlerain.ai Interface Showing Decision-Based Interaction
(Source: Author screenshot (2026))

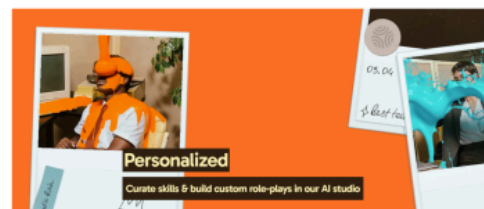


Figure 2. Gentlerain.ai Layout and Interaction
(Source: Author screenshot (2026))

Case Study 2: The Blue Desert (Climate Change Narratives)

The Blue Desert is the ultimate digital storytelling and environmental education platform for climate. With a mix of visual storytelling, ambient sound design, and interactive navigation, the platform provides a highly emotive learning experience. Using visual storytelling and interactive visual elements, users encounter environmental narratives. The platform encourages reflective learning by providing an opportunity for users to explore and engage with climate-related scenarios and interpret environmental data through narrative experiences. The interface creates layers of immersion through illustrated environments, subtle animations, and ambient soundscapes. The navigational aspect is exploratory, offering learners ample opportunities to interact with narrative elements at their own pace. Key Features: Environmental storytelling, exploratory navigation, visual metaphor and symbolic narrative and ambient audio immersion.



Figure 3. Blue Desert, learning on water consumption (Source : Author screenshot (2026))

Case Study 3: Expo 58 Virtual Pavilion (Historian Reconstruction)

Expo 58 Virtual Pavilion is an immersive digital museum platform for reconstructing historical environments using interactive 3D visualization. It combines spatial storytelling, archival materials, and interactive exploration. This is spatial, rather than linear learning. You are invited to discover and immerse yourself in the environment. We showcase a 360-degree visual environment, ambient audio, and interactive artifacts to establish an immersive learning environment. Key Features: Spatial storytelling, 3D historical reconstruction, Interactive artifacts and Exploratory navigation.

Spatial immersion in experiential learning is supported through these features.



Figure 4. Expo 58 Information Page (Source : Author screenshot (2026))

To enable a systematic comparison among the selected platforms, three case studies were explored through a structured analytical framework. Some of the assessment areas were narrative design, sensory engagement, emotional design, interaction patterns and alignment to

Kolb's experiential learning cycle. It provides a systematic comparison that seeks to indicate common design strategies and elucidates how sensory and emotional storytelling is leveraged to support experiential learning in the digital space across platforms. The cross-case analysis results are shown in Table 5.

Table 5. Case Study Comparative Analysis (Source: Author)

Dimension	Gentlerain.ai	Blue Desert	Expo 58
Platform Type	Workplace simulation	Climate storytelling	Virtual museum
Narrative Structure	Branching scenario	Symbolic narrative	Spatial storytelling
Sensory Design	Visual, Auditory, UI interaction	Visual, Auditory	Visual, Auditory, Tactile
Emotional Design	Workplace empathy	Environmental empathy	Historical immersion
Interaction Type	Decision-based dialogue	Exploratory scrolling	Spatial navigation
Kolb - Concrete Experience	Simulated workplace	Narrative immersion	Spatial immersion
Kolb - Reflection	Feedback loops	Symbolic interpretation	Artifact analysis
Kolb - Conceptualization	Strategy learning	Climate understanding	Historical learning
Kolb - Experimentation	Decision branching	Exploratory navigation	Path selection
Learning Impact	Soft skill development	Environmental awareness	Historical understanding

The comparison indicates that although all of the given platforms use some form of narrative-based learning, they are being constructed around different design centricities. Gentlerain.ai promotes decision-making interaction and

workplace simulation and is recognised for experimentation and learning skills through active experiments. The Blue Desert, in essence, encourages emotional storytelling and reflective learning based on storytelling with symbolic environmental stories. In contrast, Expo 58 Virtual Pavilion emphasizes spatial engagement and exploratory learning through historical reconstruction. These differences imply what sensory and emotional design can have a way to enhance experiential learning but that there are some narrative strategies available at the design stage. But the platform also has different sensory and emotional design themes beyond narrative and interaction modes. In that, the presentation of each case is a different visual, auditory, and tactile interaction that ultimately determines student involvement and affective involvement. To examine contrast in this design, we studied the sensory and emotional design attributes of each platform and compared them (Table 6). In the sensory representation it is shown that a visual design component was better than all the platforms and the aural one supported to immerse the environment. Gentlerain.ai is the preference for the tactile experience of UI-centric decisionmaking, whereas Expo 58 Virtual Pavilion prefers spatial immersion. The Blue Desert, however, embraces visual storytelling and its emotional register to encourage reflection. With the integration of these learning objectives based on how a story unfolds in narrative form through multimedia, experiential learning is attained.

Table 6. Sensory and Emotional Design Comparison

Platform	Visual	Auditory	Tactile	Emotional Tone	Engagement Type
Gentlerain.ai	High	Medium	High	Professional realism	Decision-driven
Blue Desert	Very high	High	Low	Reflective emotional	Narrative-driven
Expo 58	Very high	High	Medium	Historical immersion	Exploration-driven

To achieve systematic comparison, the three platforms were examined through a structured analysis considering narrative design, sensory engagement, emotional design, and experiential learning alignment.

Result

The comparison of these three online storytelling platforms Gentlerain.ai, The Blue Desert, and Expo 58 Virtual Pavilion illustrates how sensory and emotional design is part of educational experiences if we consider digital learning in digital media in the light of other digital technologies. All platforms implement different strands for storytelling strategies; however, these platforms all provide the general understanding that from an overall narrative-oriented interaction, a narrative-centric communication and multi-sensory interactions, narrative and narrative modes are used across the platforms, which is the story on which learners immersive and participatory immersive interaction is carried out. A strict rubric was used for systematic comparison on all platforms (systematic scoring in the methodology) to ensure consistency among different platforms and methods. Analysis: Narrative, sensory, emotional, type of interaction, Kolb theory (or Kolb’s Experiential Learning Cycle). What Table 3 shows is not only how the three platforms differ in ways we would expect, but why that separates us in terms of learning design. Gentlerain.ai’s branching dialogue, exposing learners to major questions; all decisions have cognitive implications. This is qualitatively different from The Blue Desert’s exploratory scrolling, when the learner can just give the task up without payback. That absence of that pressure isn’t a design disadvantage in context here; it’s a deliberate emotional strategy: climate grief is poorly suited to mechanics of urgency. Expo 58 is on yet another level:

here spatial motion supplants narrative agency.

Learners do not select outcomes; instead, they construct meaning from fragments of a historical context. This variability indicates that narrative structure serves not only an aesthetic purpose but also a pedagogical function, making it more than just a method of presentation. The emphasis on which stage of Kolb’s cycle to examine is influenced by the type of interaction involved. Gentlerain.ai effectively combines experiential learning with practical experimentation, whereas The Blue Desert distinctly separates these elements. Neither approach is superior to the other; however, it is essential to recognize that different methodologies yield varying expectations for learning outcomes.

Table 7. Cross-Case Comparison of Digital Storytelling Platforms

Dimension	Gentlerain.ai	Blue Desert	Expo 58
Narrative Structure	Decision-based storytelling	Symbolic storytelling	Spatial storytelling
Sensory Design	Visual, auditory, interactive UI	Visual and auditory	Visual, auditory, spatial
Emotional Design	Workplace empathy	Environmental empathy	Historical immersion
Interaction Type	Branching dialogue	Exploratory navigation	Spatial navigation
Kolb Concrete Experience	Workplace simulation	Narrative immersion	Historical immersion
Reflection	Feedback loops	Symbolic reflection	Artifact exploration
Conceptualization	Skill development	Climate awareness	Historical learning
Experimentation	Decision branching	Exploration	Navigation choices
Learning Impact	Soft skill development	Environmental awareness	Contextual understanding

Sensory & Emotional Design Integration.

Sensory and emotional design considerations vary, not only regarding narrative tactics, across venues. Every one of these is a combination of visual, aural, and interactive elements which affects the way learners engage.

Given the screen-based nature of the medium, the strong visual dominance of the three is hardly to be disfavored, the way visual design works is rather mixed. In Gentlerain.ai, the interface utilizes a polished, corporate-like design featuring neutral backgrounds, clear typography, and color-coded responses that enhances the professional authenticity of the simulation visually. These design elements prepare learners to view their interactions as significant, grounding the emotional experience in a sense of responsibility rather than sentiment.

In The Blue Desert, color scheme and illustration can also be loaded with an emotional meaning that even text cannot offer. There are several deliberate visual metaphors that The Blue Desert uses to carry its emotional and logical weight. The platform’s desaturated blue-grey color palette visually enacts ecological loss: the lack of warmth in the color register becomes its own argument about environmental depletion before a word is even read. The landscapes portrayed are stylized, semi-abstract: familiar enough to evoke recognition, yet sufficiently distorted to induce unease, evoking an experience that reminds us of the emotional dissonance of climate grief. Navigation itself is cast as wandering through a diminished landscape, and user movement is rendered a mode of embodied testimony. These visual and navigational choices work seamlessly to externalize an emotional stance to make the case for environmental urgency through aesthetic experience, not just the data.

Expo 58's dedication to maintaining archival precision including textures reflective of the period, accurate spatial dimensions, and careful arrangement of artifacts, it serves as a type of visual rhetoric. This approach convinces users of the historical validity of the experience even before they engage with any explanatory content.

Expo 58's 3D reconstruction yields visual fidelity to construct historical trust; the detail itself is the argument. In the tactile column the most fascinating result lies. Gentlerain.ai receives very high scores for tactile interaction of UI mechanics, and The Blue Desert has a very low score, although elicits the strongest emotional feedback across observations. Even symbolic and atmospheric design can encourage similar emotional investment in a different way and this is something we have been forgetting in our multisensory frameworks (Schifferstein, 2011; Wu et al., 2023). Meaning that greater interaction density does not equal more emotional engagement.

The Impact of Sensory Design on Experiential Learning

The model originally formulated by Kolb relates the four stages sequential experience that is followed by the reflection stages then eventually conceptualization (Susanto, 2023). And the case study evidence renders this even more complex. As we are at Expo 58, the three processes of artifact exploration and conceptualization take place simultaneously: a learner considering a photograph drawn from the archives is both experiencing and interpreting. The stages themselves are less a pipeline than an entire ensemble of affordances that good environments can expose along with them. Sensory design looks to play a gating role here. When sensations are coherent and relevant like in Gentlerain.ai's feedback sounds or The

Blue Desert's ambient score, and both decrease the cognitive threshold for emotional involvement and allow students to more readily transition into reflective processing. When sensory input conflicts or overwhelms (often happening in places that are spatially complicated such as Expo 58), cognitive load increases and the reflective phase fails to ensue. Sensory design, then, is not decorative, it is structurally significant for experiential learning. The cross-case findings demonstrate that all three platforms make a partial contribution to Kolb's cycle, although not always uniformly. Of the three platforms, The Blue Desert case is the most limited in supporting the active experimentation. Its exploratory structure allows repeated passages but does not enable consequence based course correction. This represents a significant design gap without meaningful stakes, the exploratory experience risk functioning as passive browsing rather than purposeful learning. For narrative-driven environmental technologies, another way to fill this gap would seem innovating with low-stakes decision points. Conversely, while Gentlerain.ai is pedagogically valid in active experimentation it needs some features that encourage students to reflect in depth, aligning it with the Mezirowian theory of perspective transformation (Zhang et al., 2025). Bringing these two environments together by leveraging experiential learning strengths on decision-driven platforms to enable instant feedback, and narrative environments that give more space for participants to reflect as experiential knowledge grows holistically (Kimura & Nakajima, 2023; Srikasem et al., 2025; Wong et al., 2024) would allow for not only active experimentation for students, but also healthy reflective and conceptualization skills to emerge. The proximity of Kolb stages to specific design elements as well demonstrates reverse-engineering potential: instructional designers may begin with the cycle of learning from the

initial phase and then work backwards to find the sensory and narrative constituents of the design instead of attempting to put theory onto existing design.

Relationship Between Sensory Design and Experiential Learning

The model as first developed by Kolb describes the four stages as sequential experience followed by reflection prior to conceptualization (Susanto, 2023). And the case study evidence only complicates matters. At Expo 58 the process of exploration and concept-making of artifacts is experienced and interpreted at the same time as a student reflecting over a photograph from the collection of archives. In fact, the stages aren't so much a pipeline as an entire hodgepodge of facilitations affordances that good environments can open up together in parallel. In a sense, sensory design plays one small but gating role. When sensory stimuli are coherent and meaningful (eg, Gentlerain.ai's feedback sounds, or The Blue Desert's ambient score, both serve to decrease the cognitive threshold for emotional engagement and to help students enter into reflective processing that is less painful and encourage the less intense cognitive level of reflection. When sensory inputs (like colour, volume, temperature and depth) overpower or get in the way (which they do whenever they work in a spatially complex setting like Expo 58), cognitive load jumps up; this is where the reflective phase disappears. Instead, sensory design becomes a structural issue, one that determines whether experiential learning occurs.

Experiential Learning Alignment

The cross-case results suggest that all three platforms make an uneven contribution to Kolb's cycle. The Blue Desert is the least conducive to active experimentation; the exploratory phase of the des-

ert allows you to repeat a passage, but in this case you cannot take any real consequence-based course correction. That is a serious gap, because without exploring the cost involved, the experimental quest will almost certainly become more of a tourism experience than an educational one. But with more narrative-based environmental technologies, an additional way a potential solution could be explored seems like innovating with low-stakes decision-points. Conversely, while Gentlerain.ai is a great pedagogical sound force for active experimentation, it requires some features to encourage a more intentional reflective observation, thus aligning itself with the Mezirowian theory of transformation of the perspective (Zhang et al., 2025). This combination of decision-driven platforms that offer immediate feedback with narrative environments that create space for more reflective experience—all of which would serve the holistic growth of experiential knowledge (Kimura & Nakajima, 2023; Srikasem et al., 2025; Wong et al., 2024) would provide an area of strengths across experiential learning models since, far from having to engage in active experimentation, students would be able to also cultivate healthy reflective and conceptualization skills. This concordance of Kolb's stages with design elements can also indicate reverse-engineering potential: instruction designers may begin with learning cycle patterns and work backwards to discover the sensory and narrative elements essential for these design solutions, rather than using a retrofit technique of theory on top of existing designs.

1

Discussion

This section describes the findings and analysis of the research data and explains the limitations of the study. It can also describe what the results of the study implies, why does it matter, and the per-

spective for future research.

Integrating Previous Experiential Learning Model

Susanto (2023), which has integrated sensory design into experiential learning in digital storytelling. Susanto (2023) developed the experiential learning model to link the experiential use of stories and sensory activities in online learning environments.

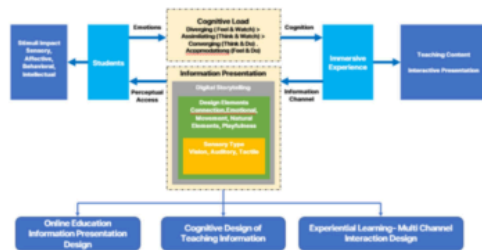


Figure 5. Experiential Learning Model
(Source: Susanto, 2023)

Narrative interaction and sensory involvement are identified as important elements that encourage experiential learning through the model. Although the framework is built upon sensory interaction and narrative engagement, it does not consider emotional design and cognitive load factors. In addition, the model is not directly related to practical implementation strategies for instructional designers. These restrictions hint at the limitations of a cohesive framework.

Proposed Narrative Sensory Experiential Learning Model

The proposed model supplements cross-case insights and earlier theoretical constructs—such as Susanto’s (2023)—by extending beyond sensory interaction and narrative engagement to incorporate emotional design and cognitive load management (Albeedan et al., 2024; Kimura

& Nakajima, 2023; Schifferstein, 2011; Wong et al., 2024; Wu et al., 2023; Radović et al., 2021; Srikasem et al., 2025).

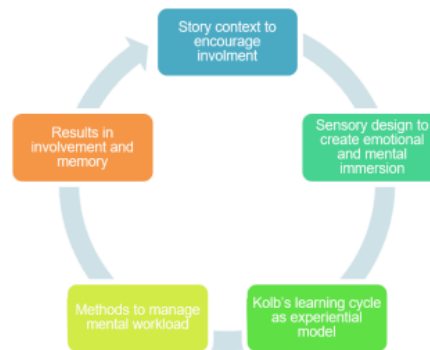


Figure 6. Narrative Sensory Experiential Learning Model
(Source: Author)

The five parts of the model are interlinked and well-evidenced in digital venues:

1. Narrative Design: Motivational and relevant (e.g. metaverse-based simulations) (Wong et al., 2024)) to story-driven learning environments that keep learners engaged.
2. Sensory Design: Utilise a diverse range of visual, auditory and interactive content which enables coherent perceptual experiences (Schifferstein, 2011; Wu et al., 2023) and enables increased product and learning outcomes.
3. Emotional Design: Emotionally engaging and motivational storytelling which could also support motivation, empathy and perspective transformation, confirming Kolb’s cycle with the reflective depth provided by Mezirow (Zhang et al., 2025).
4. Experiential Learning Cycle: Utilize Kolb’s stages (concrete experience, reflective observation, abstract conceptualization and active experimentation), this will contribute to cycles of learning

during authentic activities (Albeedan et al., 2024; Kimura & Nakajima, 2023; Radović et al., 2021).

5. Cognitive Load Management: Balanced pacing and the appropriate placement of pacing and interaction design to minimize overload as much as possible, thus avoiding excessive complexity and maximizing experiential depth (Radović et al., 2021; Srikasem et al., 2025).

These components provide a unified framework that deliver immersive learning experiences designed through a reverse engineering process to environments to align with the affordances of Kolb while minimizing common pitfalls like excessive cognitive load.

The NSELM will provide visual communicators and instructional designers with practical advice through case studies implementation. Digital storytelling contexts integrating narrative, sensory, and emotional elements all add to the experiential learning outcomes (Wong et al., 2024; Zhang et al., 2025), and by doing so, not only allow participants to learn about the world, but also develop cognitive and affective skills which are pivotal in solving complex problems in authentic situations (Fadli, 2025). It is important for designers to have their sights set on the creation of similar immersive environments capable of affording parallel access to Kolb's stages, employing symbolic visuals for reflection (e.g., The Blue Desert) and decision feedback for experimentation (e.g., Gentlerain.ai). Not only does this integration increase engagement, but it results in knowledge transfer as was verified in VR and metaverse platforms (Radović et al., 2021; Srikasem et al., 2025).

Theoretical Contribution

The proposed Narrative Sensory Experiential Learning Model contributes to the existing literature by expanding previous

experiential learning frameworks in three key ways. First, the model integrates sensory and emotional design as central components rather than supporting elements, positioning multisensory interactions as mediating mechanisms that influence transitions between stages in Kolb's experiential learning cycle. Second, the model incorporates narrative design as a structured framework that organizes learning experiences into meaningful sequences.

Unlike previously proposed models that primarily focus on interaction and engagement, this framework provides a more holistic integration of narrative, sensory, emotional, and cognitive dimensions. This contribution offers a structured approach to designing immersive digital storytelling experiences that support both cognitive and affective learning processes.

Practical Design Checklist

To support implementation, this study proposes a checklist based on the proposed model.

Table 8. Proposed Design Checklist

Design Area	Checklist Questions
Narrative	Does the story reflect realistic, speculative, or historical relevance to the learning topic? Is the learner positioned as an active agent in the story?
Sensory Design	Are multiple senses (visual, auditory, tactile/UI) activated coherently? Are sensory cues aligned with cognitive or emotional objectives?
Kolb Alignment	Does the design clearly offer a concrete experience, opportunities for reflection,

	conceptual insights, and decision-based experimentation?
Cognitive Load	Is content segmented logically? Are there pacing mechanisms to avoid overload (e.g., episodic scenes, pause options)?
Emotional Engagement	Are aesthetic and narrative elements crafted to evoke meaningful emotional responses? Is feedback personalized and supportive?
Usability	Is the UI intuitive and responsive? Are users guided without cognitive dissonance? Can learners control pacing and interaction?

The checklist provides practical guidance for instructional designers in developing immersive digital learning environments.

Conclusion

This study explored the role of sensory and emotional design elements applied to digital storytelling environments in facilitating experiential learning for e-learning tools. With qualitative multiple case analysis of Gentlerain.ai, The Blue Desert, and Expo 58 Virtual Pavilion, the results show that not only emotion engage through narratives, but also multi-sensory experiences contribute to learner immersion, reflection, and engagement. The cross-case analysis illuminated varying ways in which the narratives of these e-learning platforms can assist experiential learning through a diversity of sensory and emotional tactics. Gentlerain.ai promotes decision-driven learner interac-

tion, and interactive learning experiences are supported, The Blue Desert engages reflective inquiry through symbolic story, Expo 58 Virtual Pavilion encourages spatial immersion and context investigation. These differences reflect the need to consider the design of the digital learning environment of the design of multiple storytelling modes so that various experiences complement each other. Similarly, multisensory integration offers optimal results in terms of supporting learner interaction when integrated with cognitive, emotional and social aspects with a view of supporting engagement. Across platforms, visual design became the predominant sensory modality, while auditory and interactive elements contributed to emotional engagement and learning motivation. These findings emphasize the importance of combining a sensory and emotional dimension in digital narrative modalities.

This study extends these findings and previous work by suggesting the Narrative Sensory Experiential Learning Model. Based on previous frameworks, the model adapts elements of narrative design, multisensory interaction, emotional engagement, principles of experiential learning, and cognitive load considerations to form a holistic learning design framework. Therefore, this model provides theoretical and practical considerations for the construction of immersive digital learning environments. Additionally, this work provides a utilitarian design checklist for teachers and those engaged in visual communication. This checklist links theoretical constructs to practical strategies for the concept creation of stimulating and learner-centred e-learning environments. The results presented in this study contribute to visual communication design by showing how storytelling, multi-sensory and emotional design are interconnected to generate an experiential learning process.

They also provide a blueprint for creating inspiring and significant learning experiences, in turn extending the relevance of this work to digital pedagogy. However, this study has not been without limitations. A qualitative study design limited the generalizability of these three case studies that were selected. In future studies, user testing (via user test), eye monitoring, and measuring engagement metrics and engagement would likely be used to prove the proposed theory. Future research should similarly investigate integrating new forms of technology (i.e., AI, VR, adaptive learning systems). It is not yet possible, however, to explore their potential to stimulate more intensifying sensorily emotional responses closer to the human mind and emotions in digital storytelling scenarios. This approach is representative of the emphasis on sensory experience and emotional depth in digital teaching and learning a development that is growing increasingly important in this era we're living to this day. Digital platforms have full potential to make learning experiences that are joyful, fun, changeable, enriching and transformative, embedded in story-based learning with narrative storytelling and multimodal storytelling and experiential methods of learning pedagogies.

References

- Albeedan, M., Kolivanda, H., & Hammady, R. (2024). Designing and evaluation of a mixed reality system for crime scene investigation training: a hybrid approach. *Virtual Reality*, 28(3). <https://doi.org/10.1007/s10055-024-01018-8>
- Baceviciute, S., Córdoba, A. L., Wismer, P., Jensen, T. V., Klausen, M., & Makransky, G. (2021). Investigating the value of immersive virtual reality tools for organizational training: An applied international study in the biotech industry. *Journal of Computer Assisted Learning*, 38(2), 470. <https://doi.org/10.1111/jcal.12630>
- Doumanis, I., Economou, D., Sim, G., & Porter, S. (2018). The impact of multimodal collaborative virtual environments on learning: A gamified online debate. *Computers & Education*, 130, 121. <https://doi.org/10.1016/j.compedu.2018.09.017>
- Fadli, H. (2025). AI-Enabled Microlearning and Case Study Atomisation: ICT Pathways for Inclusive and Sustainable Higher Education. *Sustainability*, 17(24), 11012. <https://doi.org/10.3390/su172411012>
- He, J. (2024). Research on Emotional Design Teaching of Digital Illustration in Universities Under New Media Environment. *The Educational Review USA*, 8(4), 541. <https://doi.org/10.26855/er.2024.04.008>
- Kee, T., Zhang, H., & King, R. B. (2023). An empirical study on immersive technology in synchronous hybrid learning in design education. *International Journal of Technology and Design Education*, 34(3), 1243. <https://doi.org/10.1007/s10798-023-09855-5>
- Kimura, R., & Nakajima, T. (2023). Designing innovative digital platforms from both human and nonhuman perspectives. *Multimedia Tools and Applications*, 82(26), 39961. <https://doi.org/10.1007/s11042-023-15124-3>
- leBrasseur, R. (2023). Virtual Site Visits: Student Perception and Preferences Towards Technology Enabled Experiential Learning. *International Journal of Emerging Technologies in Learning (iJET)*, 18(2), 115. <https://doi.org/10.3991/ijet.v18i02.32013>

- Lin, H.-C. K., Lu, R.-S., & Wang, T.-H. (2025). Writing Is Coding for Sustainable Futures: Reimagining Poetic Expression Through Human-AI Dialogues in Environmental Storytelling and Digital Cultural Heritage. *Sustainability*, 17(15), 7020. <https://doi.org/10.3390/su17157020>
- Lorenz, J., Recker, J., & Kruse, L. C. (2025). How Physical-Digital Experiences are Designed. *Business & Information Systems Engineering*. <https://doi.org/10.1007/s12599-025-00956-0>
- Palmieri, S., Lotti, G., Bisson, M., D'Ascenzi, E., & Spinò, C. (2025). Fostering Embodied and Attitudinal Change Through Immersive Storytelling: A Hybrid Evaluation Approach for Sustainability Education. *Sustainability*, 17(17), 7885. <https://doi.org/10.3390/su17177885>
- Patiño, A., Soledad, M., & Fernández, M. B. (2023). Active learning and education 4.0 for complex thinking training: analysis of two case studies in open education. *Smart Learning Environments*, 10(1). <https://doi.org/10.1186/s40561-023-00229-x>
- Radović, S., Hummel, H., & Vermeulen, M. (2021). Design-based research with mARC ID model: designing experiential learning environments. *Learning Environments Research*, 25(3), 803. <https://doi.org/10.1007/s10984-021-09394-7>
- Recke, M. P., & Perna, S. (2021). Emergent Narratives in Remote Learning Experiences for Project Based Education. *The Electronic Journal of E-Learning*, 19(2), 59. <https://doi.org/10.34190/ejel.19.2.2142>
- Robin, B. (2016). The Power of Digital Storytelling to Support Teaching and Learning. *Digital Education Review*, 30, 17. <https://doi.org/10.1344/der.2016.30.17-29>
- Sahraie, F., Rezvanfar, A., Movahedmohammadi, S. H., Ebner, M., Alambeigi, A., & Farrokhnia, M. (2024). Analysis of Learners' Emotions in E-Learning Environments Based on Cognitive Sciences. *International Journal of Interactive Mobile Technologies (IJIM)*, 18(7), 34. <https://doi.org/10.3991/ijim.v18i07.48471>
- Santi, Y., Dhani, A., Juniman, Safrina, Fitriana, & Fitri, E. (2024). Utilization of Digital-Based Interactive Stories in Indonesian Language Lessons as Innovative Media.
- Schifferstein, H. N. J. (2011). Multi sensory design. <https://doi.org/10.1145/2079216.2079270>
- Smeda, N., Dakich, E., & Sharda, N. (2014). The effectiveness of digital storytelling in the classrooms: a comprehensive study. *Smart Learning Environments*, 1(1). <https://doi.org/10.1186/s40561-014-0006-3>
- Srikasem, S., Seephom, S., Viriyopase, A., Phutrakool, P., Khawintheseth, S., Narajeenron, K., & Group, E.-V. S. (2025). Comparing the Effectiveness of Multimodal Learning Using Computer-Based and Immersive Virtual Reality Simulation-Based Interprofessional Education With Co-Debriefing, Medical Movies, and Massive Online Open Courses for Mitigating Stress and Long-Term Burnout in Medical Training: Quasi-Experimental Study. *JMIR Medical Education*, 11. <https://doi.org/10.2196/70726>
- Susanto, R. A. (2023). Experiential Learning with Digital Storytelling: a

Website Studies Review of Sensory Design Elements & Interactive Strategies.

Tamimi, M. A. A. (2024). Effects of Digital Story-telling on Motivation, Critical Thinking, and Academic Achievement in Secondary School English Learners. *Research in Social Sciences and Technology*, 9(1), 305. <https://doi.org/10.46303/ressat.2024.18>

Wong, P. P., Wong, G. W. C., Pangsa-pa, P., & Shen, D. J. (2024). Virtual to Reality: Understanding the Role of Metaverse as a Pedagogical Strategy. *The Electronic Journal of E-Learning*, 0. <https://doi.org/10.34190/ejel.21.6.3219>

Wu, W., Guo, J., Li, Y.-J., & Sun, Y.-L. (2023). Research on the Design of Virtual Reality Online Education Information Presentation Based on Multi-Sensory Cognition. *Inventions*, 8(2), 63. <https://doi.org/10.3390/inventions8020063>

Yang, Y., & Wu, W.-C. (2012). Digital storytelling for enhancing student academic achievement, critical thinking, and learning motivation: A year-long experimental study. *Computers & Education*, 59(2), 339. <https://doi.org/10.1016/j.compedu.2011.12.012>

Zhang, Y., Fan, J., Liu, H., & Ismail, R. (2025). Immersive Simulation for Caregiver Empathy Training: A Metaverse-AR Educational Framework Addressing Cognitive Impairment Care Challenges. *SN Computer Science*, 6(7). <https://doi.org/10.1007/s42979-025-04366-7>

ORIGINALITY REPORT

4%

SIMILARITY INDEX

3%

INTERNET SOURCES

2%

PUBLICATIONS

1%

STUDENT PAPERS

PRIMARY SOURCES

1	ejournals.umn.ac.id Internet Source	1%
2	Submitted to Rose State College Student Paper	1%
3	f1000research-files.f1000.com Internet Source	<1%
4	Kęstutis Daukšys. "Neuromarketingo metodų taikymas investicijoms į užstatytos aplinkos nekilnojamąjį turtą vertinti", Vilnius Gediminas Technical University, 2026 Publication	<1%
5	Kilpatrick, Kelley, Mélanie Lavoie-Tremblay, Lise Lamothe, Judith A. Ritchie, and Diane Doran. "Conceptual framework of acute care nurse practitioner role enactment, boundary work, and perceptions of team effectiveness :", Journal of Advanced Nursing, 2013. Publication	<1%
6	philarchive.org Internet Source	<1%
7	ebuah.uah.es Internet Source	<1%
8	Tris Kee, Hao Zhang, Ronnel B. King. "An empirical study on immersive technology in synchronous hybrid learning in design education", International Journal of Technology and Design Education, 2023 Publication	<1%
9	www.egax.org Internet Source	<1%
10	inpact-psychologyconference.org Internet Source	<1%
11	Mustofa Mustofa, Agus Supriadi, Muhamad Buchori, Saepudin Saepudin et al. "STRENGTHENING HALAL TOURISM GOVERNANCE IN PEKALONGAN: A Maq??id-Based Collaborative Governance Framework within Siyasa Dusturiyah", Al-Risalah: Forum Kajian Hukum dan Sosial Kemasyarakatan, 2026 Publication	<1%

12

Schepis, Peter. "An Examination of Transfer of Training in an Organization in Pennsylvania: A Qualitative Descriptive Case Study.", National University

Publication

<1%

13

Slim Smaoui, Angelos Vakalopoulos, Varzakas Theodoros. "Advances in Sustainable Meat Technology - Engineering, Quality, and Safety", CRC Press, 2026

Publication

<1%

Exclude quotes

On

Exclude matches

< 7 words

Exclude bibliography

On

FINAL GRADE

GENERAL COMMENTS

/0

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13

PAGE 14

PAGE 15

PAGE 16

PAGE 17

PAGE 18

PAGE 19