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Developing a Conceptual Model of Emotional Experience Design for Generation Alpha's Learning and Play UX in the Age of AI

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Abstract

This study addresses a structural gap in existing user experience (UX) research by proposing a culturally situated conceptual model for emotional experience design (EXD) in AI-mediated learning and play environments for Generation Alpha children in East Asian contexts. As AI becomes an embedded component of children's daily educational and recreational lives, the emotional dimensions of interaction — curiosity, trust, relational engagement, and critical awareness — have emerged as determinants of sustained participation. Yet existing frameworks largely prioritize functional efficiency over emotional responsiveness, and few account for the sociocultural specificity of East Asian educational environments characterized by high academic expectations, performance-oriented evaluation, and Confucian relational values. To address this gap, the study employed a two-phase methodology. The first phase comprised a systematic literature review across four academic databases — EBSCO, CHAINS, Airiti Library, and CNKI — yielding a corpus of 15 documents analyzed through AI-assisted affinity mapping. The second phase consisted of naturalistic observation and Focus Group Interviews (FGI) with eight South Korean elementary school children (4 male, 4 female) aged 10 to 11, conducted over 16 weeks. Analysis of the empirical data identified six affinity clusters representing the core emotional experience patterns of Generation Alpha children in AI interaction, which were subsequently mapped onto four conceptual dimensions: Technical, Experiential, Emotional, and Ethical. The resulting EXD model structures these dimensions as a progressive foundation in which each layer constitutes a necessary condition for the next, while the uppermost dimension — Ethical Transparency — feeds back to reinforce the entire structure. The model contributes a theoretically grounded and empirically informed framework for child-centered AI UX design that is responsive to the sociocultural conditions of East Asian educational contexts, and serves as a foundation for future empirical validation and design application.

Keyword : Generation Alpha, Emotional experience design, AI-mediated learning, UX design, East Asian context, Affinity mapping, Child-centered design

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1. Introduction

1.1 Research Background and Problem Statement

Generation Alpha, born from 2010 onward, is the first generation to grow up within a fully AI-mediated environment, encountering artificial intelligence not as an auxiliary tool but as an embedded component of daily learning and play [1]. Smart speakers respond to their questions, AI tutors adapt to their pace, and generative AI tools participate in their creative activities. For this generation, AI is not a novelty but a default condition of experience.

This shift has significant implications for user experience (UX) design. In AI-mediated environments, interaction is no longer evaluated solely in terms of usability or efficiency. Instead, children's engagement is shaped by affective responses — curiosity when encountering something unexpected, trust built through repeated reliable interaction, comfort derived from predictable feedback, and enjoyment sustained through meaningful participation. These responses are not incidental byproducts of interaction but structural factors that determine whether a child continues, withdraws, or re-engages with a system.

If emotional experience is insufficiently considered in AI-mediated environments, children may fail to sustain interaction or develop trust toward the system, leading to disengagement and fragmented learning or play experiences. This suggests that emotional experience is not an optional enhancement but a necessary condition for maintaining interaction continuity.

At the policy level, UNESCO [2] emphasizes that AI in education should be developed within a human-centered framework that prioritizes learner well-being and ethical responsibility. This perspective reinforces the view that AI-based systems for children must be understood not only as instructional tools but as environments that systematically organize emotional and developmental experience. Accordingly, this study positions emotional experience as a core structural condition shaping the quality and continuity of learning and play in AI-based systems.

Existing UX research on AI-mediated learning predominantly addresses functional efficiency, cognitive outcomes, and usability — rarely treating emotional experience as a primary design variable. This omission is consequential: systems optimized for performance may remain experientially unsustainable for child users whose continued engagement depends on affective responsiveness.

The problem is compounded in East Asian contexts. In South Korea, Taiwan, and China, children's learning environments are structured around high academic expectations and performance-oriented evaluation [3]. Under these conditions, AI-generated corrective feedback may not simply prompt

disengagement — it may trigger anxiety, diminished confidence, or avoidance behavior that extends beyond the immediate interaction. Existing design frameworks, largely built on generalized assumptions, do not account for these dynamics.

This study identifies the resulting gap: the absence of a culturally situated framework for emotional experience design in Generation Alpha's AI-mediated environments.

1.2 Research Aim and Objectives

Emotional experience is positioned here not as a secondary byproduct of interaction but as a structural condition determining its continuity, quality, and sustainability. Accordingly, this study develops a conceptual model for emotional experience design in AI-mediated learning and play environments for Generation Alpha, with particular attention to East Asian sociocultural contexts. To achieve this aim, four research objectives and corresponding research questions were formulated, as presented in [Table 1].

[Table 1] Research Objectives and Research Questions

Research Objectives (RO)	Research Questions (RQ)
To identify key emotional experience factors in children's interaction with AI systems	What emotional experience factors are central to Generation Alpha's interaction with AI-based systems?
To examine how these factors are shaped within East Asian educational and sociocultural contexts	How are these factors shaped by East Asian educational and sociocultural contexts?
To develop a structured conceptual model connecting AI interaction conditions, emotional responses, and UX outcomes	What conceptual structure can support the design of emotionally responsive, child-centered AI environments?
To analyze how emotional experience functions as a structural condition influencing interaction continuity and trust	How does emotional experience function as a structural condition influencing the continuity and quality of AI-mediated interaction?

2. Literature Review

2.1 Funnel Analysis

To systematically examine the research landscape surrounding emotional experience design in AI-mediated environments for Generation Alpha, this study employed a four-stage Boolean keyword filtering process across four academic databases: EBSCO, CHAINS, Airiti Library, and CNKI. The search period was limited to publications from 2020 to 2026 to reflect the recent development of artificial intelligence in educational contexts. Through successive stages of keyword refinement, the

search scope was progressively narrowed from broad research on AI and education to studies addressing user experience, emotional experience, and child-centered interaction. The search strings were applied cumulatively: ("Artificial Intelligence" OR "Generative AI") AND ("Education" OR "Learning") at Step 1, with AND ("User Experience" OR "UX" OR "Human-Centered Design") added at Step 2, AND ("Emotional Experience" OR "Conceptual Model" OR "Framework") at Step 3, and AND ("Generation Alpha" OR "Children" OR "Play-Based Learning") at Step 4.

As shown in [Table 2], the number of retrieved records decreased sharply across the four stages; in EBSCO, for example, 483,965 records at Step 1 were reduced to 7 at Step 4. For databases that returned limited results at Step 4, adjusted searches were conducted, as indicated in the table. The retained records were then manually reviewed to exclude irrelevant or duplicated studies, yielding a final corpus of 15 documents comprising 13 peer-reviewed papers and 2 grey literature sources. This steep decline suggests that research on children's emotional experience in AI-mediated environments remains limited.

[Table 2] Literature Filtering Process across Global and Regional Databases (2020-2026)

Screening Stage	EBSCO (Global)	CHAINS (South Korea)	Airiti (Taiwan)	CNKI (China)
Step 1: Broad AI-Education Landscape	483,965	997,502*	1,557	78,475
Step 2: UX-Centric Interface Screening	3,378	2,885	550	21
Step 3: Affective Design Framework	735	99	197	1
Step 4: Gen Alpha Specificity	7	3	14	0*
Adjusted	7	8	14	8
Manual Review	5	3	2	5

* CHAINS integrates both RISS and KISS databases. CNKI Step 4 adjusted via customized direct keyword search.

2.2 Key Findings: Four Conceptual Dimensions

Analysis of the 15 included documents through AI-assisted affinity mapping yielded four structurally distinct dimensions — Technical, Experiential, Emotional, and Ethical — that collectively characterize current approaches to child-AI emotional UX design across the East Asian and global research landscape, as summarized in [Table 3]. The Technical dimension positions multimodal and embodied interaction features not merely as delivery mechanisms but as preconditions for emotional accessibility [4][5]. The Experiential dimension reveals that interaction continuity depends on narrative scaffolding, co-creation, and participatory structures that sustain children's sense of agency [6][7]. The Emotional dimension frames relational qualities — trust, meaning-making, and affective resonance — as structural

properties of the interaction environment rather than incidental features [8][9]. The Ethical dimension highlights systemic risks including over-reliance, ontological opacity, and the emotionalization dilemma arising from excessive attachment to AI agents [10][11]. Related studies on AI literacy [12], mixed reality-based learning [13], metaverse picture books [14], immersive virtual classrooms [15], and AI learning companions [16] are also included in [Table 3].Taken together, these findings indicate that emotional UX in child-AI interaction is not produced by affective features alone; it emerges through the alignment of technical reliability, experiential participation, emotional responsiveness, and ethical transparency.

[Table 3] Representative Literature and Extracted Emotional UX Design Features (2020-2026)

Dimension	Global	South Korea	Taiwan	China
Technical	Child-led AI formulation [4]; AI literacy framework [12]	AI interaction design guidelines for children [10]	MR + AI embodied English learning [13]	MR + AI embodied English learning [13]
Experiential	Disney-inspired scaffolds; cross-modal synchrony[7]	Narrative scaffolding; conversational AI guidelines [10]; Metaverse picture books for Generation Alpha [14]	Interwoven co-creation dialogue [6]	Audiovisual synesthesia; embodied play [8]; Immersive virtual classroom for Generation Alpha [15]
Emotional	Non-hierarchical sidekick; emotional engagement [7]; emotional AI in education [9]	Meaning-making; guided self-reflection [10]	Interwoven co-creation dialogue [6]	Emotional design paths in music programming toys [8]; Distributed emotional resonance [5]
Ethical	Bounded fallibility; ontological transparency [7]; AI companions [16]	Over-reliance prevention; truth evaluation [10]	Not identified	Subjectivity dilemma; emotionalization challenges [11]

The cross-regional synthesis reveals both convergence and complementarity across these four dimensions. While all regions recognize the interdependence of technical, experiential, emotional, and ethical factors, no existing study integrates these dimensions into a unified design framework applicable to child-centered AI environments. This structural gap forms the basis for the conceptual model proposed in this study.

2.3 Toward a Conceptual Framework

The four dimensions identified above confirm that emotional experience is not a peripheral variable

but a structurally embedded condition of child-AI interaction. However, existing research addresses these dimensions in isolation, and no integrated framework connects them within a coherent design model. This gap is particularly consequential in East Asian contexts, where sociocultural pressures intersect with AI interaction in ways that generalized models fail to capture. To address this, the present study proposes a conceptual model of emotional experience design grounded in both the cross-regional literature synthesis presented above and the empirical observation and FGI data reported in the following section.

3. Methodology

3.1 Research Design and Strategic Rationale for Participant Selection

This study focuses on representative AI services in the East Asian market, such as storytelling AI and educational robots. Although the literature review encompasses South Korea, Taiwan, and China, the empirical observations and FGI were specifically conducted with South Korean children aged 10 to 11 — a deliberate methodological decision grounded in three evidence-based rationales.

Institutional Leadership in AI Education. South Korea is among the first countries in East Asia to formally integrate AI education into its national curriculum. The 2022 Revised National Curriculum mandates AI literacy education from the elementary level, with full implementation from 2025 [17]. This institutional commitment means that South Korean children of this age group are already embedded in structured AI learning environments, making them a uniquely representative population for studying emotional responses to AI-mediated interaction.

Digital Access and Exposure. According to OECD PISA 2022 data, South Korea ranks among the highest globally in children's access to digital devices and internet connectivity [18]. This high-density digital environment ensures that the participant group has sustained and varied exposure to AI-embedded systems — a necessary condition for the emergence of the emotional response patterns this study seeks to examine.

Developmental Appropriateness of the 10-11 Age Group. Children aged 10 to 11 occupy a transitional stage in cognitive development, moving from concrete operational to early formal operational thinking as described by Piaget [19]. At this stage, children possess sufficient linguistic and metacognitive capacity to articulate emotional experiences and reflect on their interactions with AI systems. This developmental profile makes the 10-11 age group particularly suitable for qualitative emotional UX research.

3.2 Data Collection and Analysis

The literature component of this study has been detailed in Section 2. In brief, a total of 15 documents were identified through a systematic four-step funnel analysis across EBSCO, CHAINS, Airiti Library, and CNKI, comprising 13 peer-reviewed papers and 2 grey literature sources.

The empirical component consisted of naturalistic observation and Focus Group Interviews (FGI) conducted with 8 South Korean elementary school children (4 male, 4 female) aged 10 to 11, from December 10, 2025 to March 30, 2026. Observation sessions were held once per week in a consistent setting, focusing on children's spontaneous emotional responses during AI-mediated learning and play activities — including affective expressions, peer interaction patterns, and behavioral transitions between digital and non-digital environments. Sessions were conducted in a non-interventional manner to preserve the natural flow of interaction.

Following the observation phase, FGI was conducted with the same participant group. The interview comprised 15 open-ended questions organized into five thematic clusters, designed to elicit children's emotional perceptions of AI interaction across four progressive dimensions: initial emotional responses upon first AI encounter, trust and relational engagement, sense of agency and participation, and retrospective meaning-making. Questions were intentionally framed in age-appropriate language to encourage spontaneous and uninhibited expression. The full question list was prepared as a supplementary research instrument and may be provided upon request.

Collected data were analyzed through iterative coding and affinity diagramming. AI-assisted affinity mapping was used as a supportive tool for organizing recurring keywords and preliminary semantic groupings, while final coding decisions, cluster naming, and theoretical interpretation were conducted by the researcher to ensure contextual validity and avoid automated over-interpretation. Observation records and FGI transcripts were first processed to extract recurring keywords and behavioral patterns, which were then grouped by conceptual similarity into higher-order clusters. The full empirical data collection protocol is summarized in [Table 4].

[Table 4] Empirical Data Collection Protocol

Participants	8 children (4 male, 4 female), aged 10-11
Location	Elementary school, Seoul, South Korea
Observation Period	December 10, 2025 - March 30, 2026 (16 weeks)
Session Frequency	Once per week, consistent setting
Observation Focus	Affective expressions, peer interaction, digital-analog transitions

FGI Structure	5 clusters, 15 open-ended questions
FGI Direction	Initial responses → Trust → Agency → Meaning-making
Analysis Method	Iterative coding + Affinity diagramming
Ethical Consideration	Guardian consent obtained; all photographic data were de-identified.

The protocol described above was designed to ensure both methodological consistency across observation sessions and contextual richness in the FGI data. The resulting dataset — comprising observation field notes, FGI transcripts, and photographic documentation — provided the empirical foundation for the coding and affinity diagramming process, from which the conceptual model of emotional experience design was derived. The observation sessions took place across varied learning and play settings, as illustrated in [Fig. 1].

[Fig. 1] Observation and FGI sessions with Generation Alpha children (Seoul, South Korea, 2025-2026)

[Fig. 1] presents representative scenes from the empirical data collection phase. The upper row documents naturalistic group learning and collaborative discussion sessions, reflecting the observation component of the study. The lower row captures children's direct interaction with AI-mediated devices — including a VR headset and a tablet-based AI application — alongside a small-group FGI session. Together, these scenes illustrate the varied contextual settings in which emotional responses to AI interaction were observed and recorded.

4. Findings and Conceptual Model

4.1 Empirical Findings: FGI Analysis

Analysis of the FGI data yielded six affinity clusters that collectively characterize the emotional experience patterns of Generation Alpha children in AI-mediated learning and play environments.

Cluster A — Useful but not fully trusted. Children perceived AI as a fast and capable tool while simultaneously maintaining critical distance from its outputs. Representative responses included: "It's amazing how fast it answers, but sometimes it's wrong" and "I have to check with my teacher to see if it's right." Children positioned AI not as an authority but as a starting point for thinking — a finding that reflects the critical inquiry culture cultivated in their educational context.

Cluster B — Joy from idea-to-output. The primary source of enjoyment was the transformation of a child's own idea into a concrete output. Children reported the greatest engagement when their imagination, conditions, or narrative prompts produced a tangible result — a story, a character, a structured argument. The operative emotional factor was not the output itself, but the sense of having participated in its creation.

Cluster C — Control through prompting. Children developed an active sense of control through iterative prompt crafting. They recognized that the quality of AI responses depended on the precision of their questions, leading to self-regulating interaction behavior. "If I tell it more clearly, the answer gets better" reflects a digital agency characteristic of Generation Alpha.

Cluster D — Familiarity vs. distance. Children's emotional relationship with AI was highly contingent on perceived responsiveness. When AI accurately reflected a child's tone, intent, or stated conditions, children described it as "like a real person." Conversely, generic or irrelevant responses produced immediate disengagement. Emotional proximity was thus conditional and fragile.

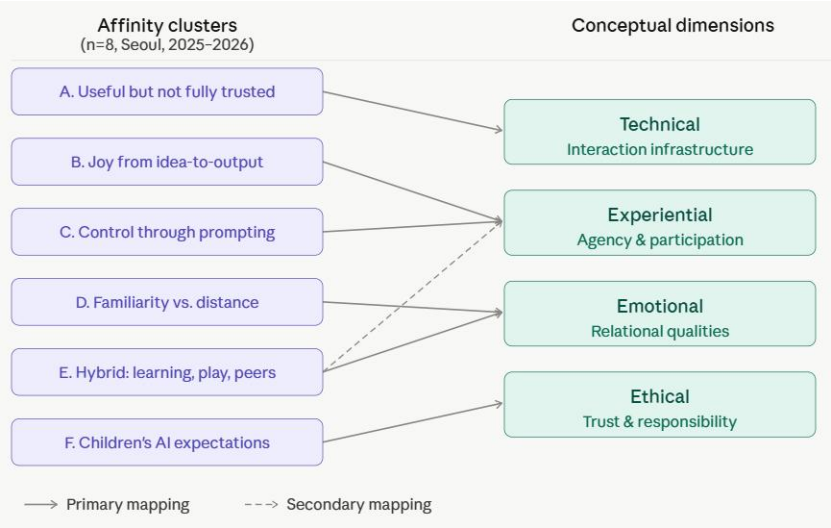
Cluster E — Hybrid: learning, play, and peers. AI functioned as a hybrid tool bridging academic and recreational contexts without clear distinction. AI-generated content frequently became the subject of group discussion and debate among peers. Responses functioned not as conclusions but as conversation starters within the peer group.

Cluster F — Children's AI expectations. Children articulated consistent normative expectations for AI improvement across four themes: greater accuracy, child-appropriate explanation, concise responses, and personalized interaction. Children preferred AI that adapts to their cognitive level rather than maximizing informational volume.

4.2 Affinity Mapping: From Clusters to Conceptual Dimensions

The six clusters were analyzed through affinity diagramming to identify higher-order structural patterns. This process yielded four conceptual dimensions — Technical, Experiential, Emotional, and

Ethical — that together constitute the architecture of children's emotional experience in AI interaction, as illustrated in [Fig. 2].



[Fig. 2] Affinity mapping results: FGI clusters mapped to four conceptual dimensions

The Technical dimension, primarily grounded in Cluster A, concerns the functional conditions that enable or constrain emotional engagement. Children's responses to AI speed, accuracy, and error frequency indicate that technical reliability is not merely a usability variable but a prerequisite for emotional accessibility — consistent with the literature synthesis in Section 2.

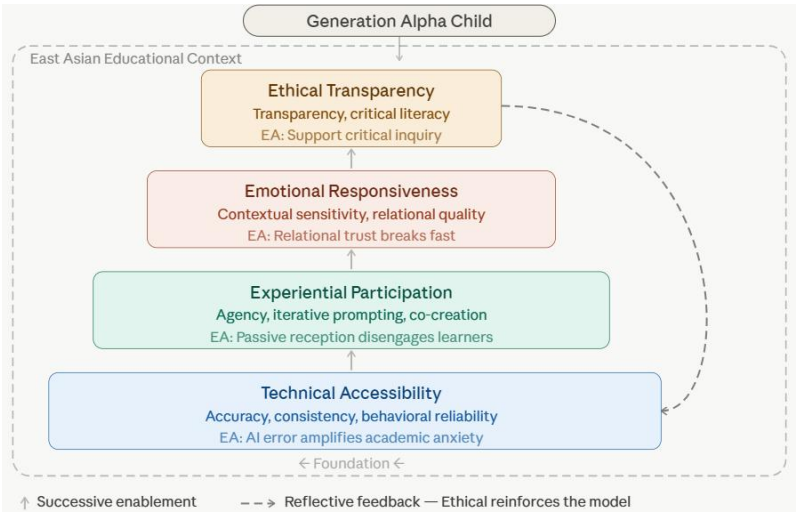
The Experiential dimension, most densely supported by Clusters B, C, and E, addresses the participatory and agentive qualities of AI interaction. The convergence of three clusters on this dimension suggests that experiential participation constitutes the central axis of children's AI engagement, with iterative prompting, co-creation, and personally meaningful output production as its primary drivers.

The Emotional dimension, grounded in Cluster D and reinforced by Cluster E, concerns the relational and affective responsiveness of AI systems. Emotional quality emerged not as an incidental feature but as a structural property of the interaction environment, contingent on AI's capacity to reflect a child's communicative intent and personal context.

The Ethical dimension, reflected in Clusters A and F, addresses children's awareness of AI limitations and their expectations for responsible system behavior. Children's self-regulatory responses — cross-checking, skepticism, iterative correction — suggest an emerging ethical literacy that design frameworks should actively support.

4.3 Proposed Conceptual Model

Emotional experience in AI interaction does not emerge spontaneously — it requires conditions. The EXD model proposed here identifies four such conditions, structured progressively: without the lower layer, the upper cannot hold. Critically, the model is not linear; the uppermost dimension — Ethical Transparency — feeds back to reinforce the entire structure [Fig. 3].



[Fig. 3] EXD Conceptual Model for Generation Alpha in AI-Mediated Learning and Play Environments

The contextual frame of [Fig. 3] reflects a specific understanding of East Asian educational environments — one structured around high academic expectations, performance-oriented evaluation, Confucian relational values, and a cultural emphasis on critical inquiry and peer discourse. Within this context, Generation Alpha children approach AI interaction not as passive consumers but as active, skeptical, and socially embedded agents. Designing for their emotional experience therefore requires a progressive layering of conditions: beginning with technical reliability that does not amplify anxiety, building toward participatory structures that honor agency, sustaining relational responsiveness that adapts to the child's intent, and culminating in ethical transparency that supports — rather than displaces — the critical thinking these children already bring to their interactions.

Technical Accessibility forms the foundational condition. In East Asian educational environments where academic performance is high-stakes, AI errors do not merely frustrate — they trigger anxiety and collapse trust before engagement can begin. Reliability and behavioral consistency are therefore

prerequisites, not features.

Experiential Participation is the primary driver of sustained engagement. Achievement-oriented children disengage when positioned as passive recipients. Design must enable iterative prompting, co-creation, and a felt sense of contribution — conditions under which children experience AI not as a tool acting upon them, but as a partner responding to them.

Emotional Responsiveness governs whether interaction continues or breaks. Children's relational trust in AI is fragile: contextual sensitivity sustains it; generic response patterns destroy it. In East Asian contexts where relational attunement is culturally valued, this dimension is not peripheral — it is decisive.

Ethical Transparency is both the ceiling and the feedback mechanism of the model. Children's critical, verification-oriented behavior — observed consistently in the FGI data — should be supported by design, not suppressed. When AI acknowledges its own uncertainty in child-appropriate terms, it honors the inquiry culture of East Asian education and, in doing so, strengthens the trustworthiness that anchors every layer below.

5. Conclusion

Generation Alpha represents a historically unprecedented user population: the first cohort for whom AI interaction is not an introduced technology but a constitutive condition of development. Existing UX frameworks were not designed for this population, nor for the sociocultural conditions — high academic pressure, Confucian relational values, and performance-oriented evaluation — that structure how East Asian children form emotional relationships with AI systems. The absence of a framework that accounts for all three variables simultaneously — generational specificity, cultural situatedness, and emotional experience as a structural design condition — constitutes the theoretical gap this study addresses.

Through a systematic literature synthesis across four regional databases and empirical observation and Focus Group Interviews with eight South Korean elementary school children, this study identified six affinity clusters characterizing the emotional engagement patterns of Generation Alpha children in AI interaction. These clusters were mapped onto four conceptual dimensions — Technical, Experiential, Emotional, and Ethical — forming the structural basis of the proposed EXD model.

The model advances the existing literature in two theoretically distinct respects. First, it repositions emotional experience not as a by-product of AI interaction but as its structural condition: a prerequisite that must be designed for, not a quality that emerges incidentally from well-functioning systems. Second,

it demonstrates that this structural condition is culturally constituted — that the same interaction event carries different emotional implications depending on the sociocultural pressures that surround it. In East Asian educational contexts, AI errors are not neutral; corrective feedback is not simply informative; and a child's critical distance from AI outputs is not a usability failure but an expression of an inquiry culture that design should honor, not overcome.

These two contributions together reframe the design problem. The question is no longer how to make AI systems more engaging for children in general, but how to design the layered conditions — technical, experiential, emotional, and ethical — under which emotional experience can emerge, sustain, and deepen for a specific population in a specific cultural context.

This study carries several limitations. The empirical component was conducted with a small, culturally specific participant group in Seoul, South Korea, limiting direct generalizability across the broader East Asian region. The qualitative and observational nature of the methodology, while appropriate for exploratory model development, does not yield statistically validated findings. The proposed EXD model therefore remains conceptual, requiring empirical validation across diverse participant groups, AI systems, and national contexts.

Future research should test the EXD model through iterative design and evaluation cycles, applying it to specific AI product categories — such as AI tutors, storytelling platforms, and educational robots — in comparative East Asian settings. Longitudinal studies tracking how children's emotional experience with AI evolves over extended interaction periods would further enrich the framework, as would participatory design approaches that position Generation Alpha children as co-designers of their own AI environments.

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