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Initiate and sustain a cycle of family engagement with art museums

by Ming-Chen Lu



**CurioLoop: Initiate and
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CurioLoop reimagines the museum experience by placing children at the center of exploration. Combining the hands-on CurioKit with the interactive CurioKid platform, this innovative system empowers young visitors as curators, fostering creativity, curiosity, and collaboration. Families become co-learners, strengthening their bonds through meaningful, child-led art discovery that extends beyond museum walls. By breaking down accessibility barriers and transforming traditional exhibits into dynamic family experiences, CurioLoop establishes museums as inclusive spaces where families connect, learn, and grow together.

Art museums, traditionally designed for adult-centric exhibits, often deter families with young children. Despite their potential for fostering creativity, critical thinking, and intergenerational connection, families perceive these institutions as unwelcoming. Existing responses, such as interactive tools in science museums, succeed in engagement but fail to leverage art museums' unique opportunities for cultural and emotional development. Many child-centered initiatives lack a cohesive approach balancing physical interaction with sustained digital engagement.

This thesis posits that empowering children to lead family interactions in art museums through thoughtfully designed tools can foster deeper engagement, sustained attention, and collaborative learning. By positioning children as leaders, museums can transform traditional experiences into opportunities for creativity, connection, and lifelong appreciation of art.

The CurioLoop ecosystem integrates two components: CurioKit, a tactile toolkit, and CurioKid, a digital platform. Research was conducted in three phases: interviews with experts, educators, and families to inform design principles; prototype testing in a public library to evaluate effectiveness; and iterative refinement based on family feedback, including preferences for features like virtual journals and interactive sharing.

While this study focuses on enhancing family engagement in art museums, it does not address broader museum accessibility or scalability across diverse contexts. The limited sample size and geographic scope may affect generalizability, but findings reveal the potential for systems like CurioLoop to redefine family engagement in cultural spaces and cultivate meaningful learning experiences.

CurioLoop provides an innovative, scalable solution for reimagining family engagement in art museums, empowering children as leaders and fostering creativity while transforming museums into inclusive, dynamic environments. This approach can inspire new audience engagement strategies across the museum field. Future research should explore scalability, offline-compatible features, and expanded tools for intergenerational engagement, refining the ecosystem to sustain interest, foster collaboration, and enhance access to art museums for diverse families.

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“... there is a need for a comprehensive medium that empowers families to explore art museums confidently.”

Art museums have long served as essential institutions for informal education, nurturing creativity, critical thinking, and cultural appreciation through engagement with tangible cultural artifacts and interactive exhibits [1], [2]. Unlike in traditional classrooms, these spaces encourage experiential and reflective learning, offering opportunities for self-directed exploration, collaboration, and dialogue.

However, shifting societal expectations and modern audience behavior have presented significant challenges for art museums.

Specifically, parents often perceive these institutions as unwelcoming environments for young children because of their quiet, structured atmospheres and adult-centric displays [3], [4]. These perceptions frequently drive families toward more interactive venues such as science and technology museums, which align better with contemporary educational preferences and family oriented leisure needs [5], [6].

However, the unique value of art museums lies in their unparalleled ability to nurture intellectual, emotional, and social development. Guided dialogues about art enhance observational skills, critical thinking, and cultural appreciation, fostering intellectual growth and social awareness[1], [7]. Moreover, programs tailored to younger audiences have been shown to bridge generational gaps and create memorable experiences for both children and adults [18], [19]. Beyond promoting intergenerational connections, these initiatives stimulate creativity, collaboration, and meaningful engagement with art.

INTROD

To meet the evolving demands of family audiences, art museums must adapt to create more inclusive and dynamic experiences that resonate with modern expectations. By doing so, these institutions can reestablish themselves as essential cultural hubs for fostering lifelong learning, creativity, and connection.

This research is dedicated to empowering families to explore art museums through innovative, child-led initiatives and community-based accessibility strategies. By rethinking traditional museum approaches, this study addresses barriers discouraging families from participating in these cultural spaces.

The objectives are to :

- Identify key obstacles parents face when introducing their children to art museums.
- Evaluate the effectiveness of child-centered programs in enhancing family engagement.
- Develop strategies for creating an ecosystem of accessible, interactive, and family friendly art museum experiences.

Ultimately, this study aims to ensure the sustainability and relevance of art museums as inclusive cultural hubs that nurture lifelong learning, foster creativity, and strengthen inter-generational connections.

UCTION



BACKG

Theoretical Foundations for Child-Led Exploration

Child-led exploration is grounded in constructivist learning theories [21] that emphasize active engagement, personal experience, and curiosity as essential components of knowledge acquisition. These theories promote environments in which children interact directly with materials, enabling them to construct their understanding through exploration and discovery. Falk and Dierking's Interactive Experience Model identifies three key contexts—personal, sociocultural, and physical—that collectively shape museum visitors' learning experiences. This model highlights the potential of child-led initiatives to foster meaningful connections between children and museum content while encouraging critical thinking and creativity [1], [8].

Research underscores that autonomy in museum exploration significantly enhances children's engagement, retention, and curiosity [22], [23]. Studies indicate that children are more likely to remember actions performed during museum visits than the informational content presented, demonstrating the importance of hands-on and experiential activities for effective learning [9]. These findings validate the role of child-led initiatives in empowering young visitors to navigate exhibits based on their interests and developmental stages, fostering deeper intellectual and emotional connections.

ROUND

Evidence from Child-Centered Museum Programs

Several museum initiatives have employed child-led approaches to improve accessibility and engagement. For example, the Queensland Museum's discovery trolleys offer mobile, hands-on activity stations that encourage playful, self-directed learning. These trolleys allow children to interact with collections at their own pace, providing opportunities for tactile exploration and sustained attention. Evaluations reveal increased interest, long-term retention, and deeper engagement, emphasizing the importance of child-centered design in fostering meaningful museum experiences [6].

Child-led tours, in which children act as guides for peers or family members, demonstrate improvements in confidence, communication skills, and collaboration. Such programs have shifted traditional hierarchies in museum visits, creating an inclusive atmosphere in which children feel valued. Meanwhile, tools such as gamified booklets and activity-based challenges have been used to engage young visitors, though their effectiveness depends on how well they integrate with exhibit content. Poorly designed tools can divert focus toward completing tasks rather than encouraging meaningful interactions with artwork, underscoring the need for thoughtful implementation [4].

BACKG

Addressing Gaps in Child-Led Exploration in Art Museums

While evidence supports child-led exploration in museums, significant gaps remain in the systematic application of these strategies across diverse contexts. Current research often focuses on isolated programs, leaving questions regarding broader implementation and adaptability to various museum types and demographics. Additionally, integrating child-led autonomy with structured educational goals poses a challenge as museums must balance spontaneity with institutional objectives. Limited research has explored the long-term effects of child-led initiatives on children's cultural development, critical thinking, and sustained engagement with art museums.

Furthermore, despite their critical role in shaping outcomes, the involvement of families, particularly caregivers, in supporting child-led programs is often overlooked. Bridging this gap is vital to developing inclusive and impactful strategies that empower families to actively participate in and benefit from child-led exploration in art museums. This study aims to create actionable frameworks that prioritize family engagement, ensuring these institutions remain accessible, relevant, and enriching spaces for shared cultural experiences.

ROUND

The Importance of Art Museums for Families

Art museums are uniquely positioned to contribute to informal education, offering transformative experiences that nurture creativity, critical thinking, and cultural appreciation [24].

However, societal changes and evolving audience behaviors have placed increasing pressure on these institutions to adapt and remain relevant. Families, particularly those with young children, represent a critical audience segment, yet they often feel excluded from traditional art museum settings. The structured and formal atmospheres of these institutions frequently conflict with children's natural tendencies for exploration and play, driving families toward alternative venues such as science and technology museums [2], [5].

Addressing this disparity is essential to reestablish art museums as inclusive spaces for family engagement. By understanding the unique needs and behaviors of families, art museums have the opportunity to create meaningful, shared experiences that enhance family connections while cultivating an early appreciation for art and culture.

MOTIV

Challenges in Engaging Children

Research underscores the unpredictable ways in which children interact with museum exhibits, often diverging from the creators' intentions. Studies reveal that children are more likely to remember the actions they performed during their visit rather than the specific content conveyed, emphasizing the importance of hands-on, action-oriented activities [9]. For instance, interactive tools like activity booklets and gamified exhibits sometimes fail to enhance learning outcomes, as children focus on completing tasks rather than engaging meaningfully with the content [10].

Additionally, without proper guidance, children may retain more vivid memories of the tasks themselves rather than the educational material or artworks [3]. These findings align with the concept that meaningful learning experiences in museums are shaped by the interaction of personal, sociocultural, and physical contexts (see Figure 1.) To address this, museums must adopt innovative, child-focused approaches that encourage curiosity and creativity while aligning with educational goals, ensuring that all three contexts are integrated to create a holistic and impactful experience.

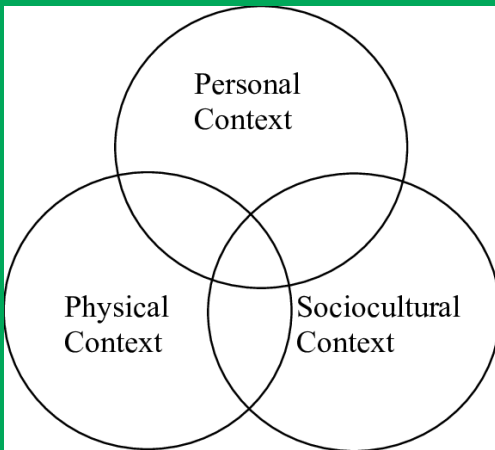


figure 1. Contextual model of learning
(Falk & Dierking, 2000)

ATION

This research is driven by the urgency to reimagine art museums as accessible and dynamic spaces for families. By integrating child-led exploration and participatory programming, art museums can bridge the gap between historical legacies and contemporary demands. These transformations not only enhance accessibility but also reaffirm art museums' roles as essential cultural and educational hubs, fostering creativity and critical thinking across generations.

As Falk and Dierking argue:

“ Museums hold the power to inspire lifelong learning by providing environments that are inclusive, interactive, and engaging for diverse audiences.”

Through this work, the study aspires to create actionable strategies that empower families and ensure the sustainability of art museums as vibrant, inclusive spaces. Ultimately, this commitment extends beyond museum walls, aiming to inspire a broader cultural shift toward inclusivity, creativity, and lifelong learning in informal education spaces.

APPROACH

Designing the CurioLoop Ecosystem

CurioLoop builds on foundational principles, fostering active exploration and long-term family engagement. This ecosystem enhances accessibility and redefines museums as dynamic spaces where children are empowered as leaders and curators.

The central hypothesis of the CurioLoop ecosystem posits that empowering children to lead museum explorations fosters deeper engagement and collaborative learning within families. Inspired by successful child-centered initiatives [4], [20], evaluations of such programs reveal increased interest, improved retention, and deeper engagement. These outcomes highlight the potential of child-centered design in creating meaningful and impactful museum experiences.

To validate this hypothesis, the research unfolded in four phases: interviews with experts, educators, and families to gather insights on fostering creativity and engagement; prototype testing in a public library to evaluate its potential in empowering children; refinement of interactions based on feedback; and a fourth phase focusing on shaping a balanced ecosystem integrating physical and digital elements.

First Phase: Consultations with Various Stakeholders to Gather Insights on Fostering Creativity & Engagement

Educational experts offered insights into designing prompts that inspire creativity while avoiding overly rigid learning structures. They emphasized the importance of letting children guide their own exploration:

What do children like most about interacting with prompts?

They enjoy when it's open-ended. It sparks their imagination.

(Educational Expert, teacher with 15 years of experience)

Museum professionals highlighted the value of scaffolding in fostering meaningful family interactions and suggested strategies to engage diverse audiences through decentralized tools:

What do you think enhances family engagement in museums?

Scaffolding is key. Families need a framework, but it shouldn't dictate their entire experience.

(Museum Professional, Family Program Manager)

Family groups provided firsthand perspectives. **Parents** expressed concerns about the lack of educational depth in many exhibits:

How do you feel about the current museum experience for your children?

They love the visuals but miss deeper learning opportunities.

(Dad with 10 year old son with his sons)

Children demonstrated enthusiasm for sharing their observations and leading family interactions:

What do you enjoy about visiting museums?

I like showing my mom the cool things I find. It's fun to tell her about them!

(Child, 10 years old, with mom)

Establishing the Foundation for Children-Led Engagement-

These insights demonstrated the potential for children to lead meaningful explorations when equipped with the right tools, while families benefit from a supportive framework that encourages engagement without dictating their experience.

While this initial phase established the feasibility of the children-led approach and the importance of flexible scaffolding, the dual focus of CurioLoop—hands-on interaction through CurioKit and digital community building via CurioKid—was further refined and validated in the subsequent phase of development.

Second Phase: Prototype Development and Testing Session



figure 1. CurioMic: A box made from paper with three cards featuring a transparent, see-through design and a voice module. Photo by Ming-Chen Lu.

The development of CurioLoop began with CurioMic (*figure 1*), an initial prototype designed as a compact, child-friendly audio box.

CurioMic featured transparent interaction cards that encouraged children to observe visual elements such as colors, shapes, and proportions. It also included an audio recording component for capturing children's reflections. The form factor of CurioMic was intentionally chosen to foster comfort and engagement, as research indicates that familiar, physical designs positively influence children's willingness to interact with technology [11].



figure 2. A family is actively engaging with a painting using the CurioMic toolkit.
Photo by Ming-Chen Lu.



figure 3. multiple children are enthusiastically exploring different elements of the CurioMic. Photo by Ming-Chen Lu.

User testing of CurioMic was conducted in a public setting at the San Francisco Library, where families were invited to explore the toolkit.

Observations revealed meaningful engagement, as families interacted with the CurioMic to explore paintings and create interpretations (*figure 2*) where a child uses a transparent card to engage with artwork. Similarly, multiple children experimented with various components of the toolkit, underscoring its appeal for collaborative exploration (*figure3*).

Feedback from the prototype testing showed that children enjoyed the tactile and visual elements of the toolkit, such as transparent cards and interactive prompts, but found the audio recording feature awkward to use. Parents appreciated the opportunity to document their children's creative outputs but showed less interest in audio-based features. Based on these insights, the audio component was removed, and the interactive prompts were further simplified to improve accessibility and ease of use [12].

Third Phase: Key Insights from Revisit Ecosystem Validation

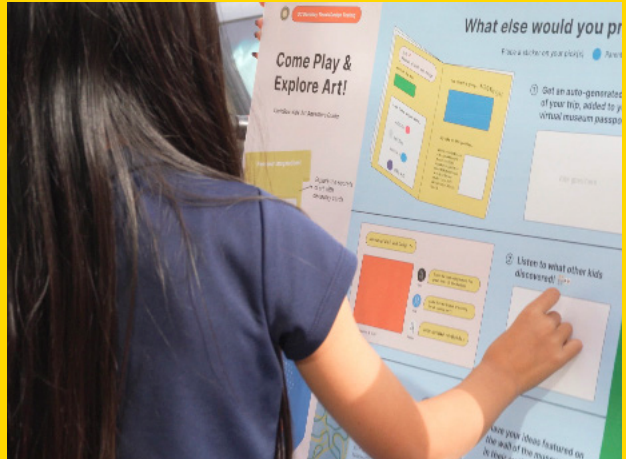


figure 1. A participant closely examining a feedback board that outlines potential extended features for the CurioLoop system. Photo by Ming-Chen Lu.

In addition to engaging with the prototype, families provided feedback on a board showcasing extended service ideas, including a virtual museum journal to document children’s interpretations, audio sharing of children’s discoveries, and opportunities to feature kids’ ideas in museum exhibits. Participants voted on these features using stickers (figure 1), with notable preferences for the virtual journal and interactive sharing options.



figure 2 A family discussing the prototype and the feedback board.
Photo by Ming-Chen Lu.

The feedback revealed several key insights:

- Families valued generated visit journals to document children's interpretations.
- There was strong interest in featuring children's ideas in museum exhibits, enhancing a sense of inclusion and contribution (*figure 1*).
- Interactive prompts for hands-on exploration were appreciated for fostering creativity and engagement.

These findings underscored the importance of a revisit ecosystem, which balances physical and digital engagement to extend the museum experience beyond a single visit. Consequently, the CurioLoop system evolved by removing the audio recording feature, simplifying prompts for greater accessibility, and prioritizing features that sustain family interaction, as demonstrated by preferences observed during testing.



figure 1. A testing booth at the San Francisco MoMA.
Photo by Katherine Liu.



Fourth Phase: Testing CurioKit at SFMOMA's Family Day

The final prototype was iterated based on feedback received from the San Francisco Public Library and tested during SFMOMA's Family Day, one of the biggest events of the year featuring the holiday maker market. Families from diverse backgrounds, including many first-time museum visitors, engaged with the kits. The cards acted as natural conversation starters between parents and children. One mother shared, "Even though we didn't find the exact matching painting, it was fun just to have this in hand and play around." The experience wasn't about finding the 'right' answer but about fostering a shared sense of exploration.

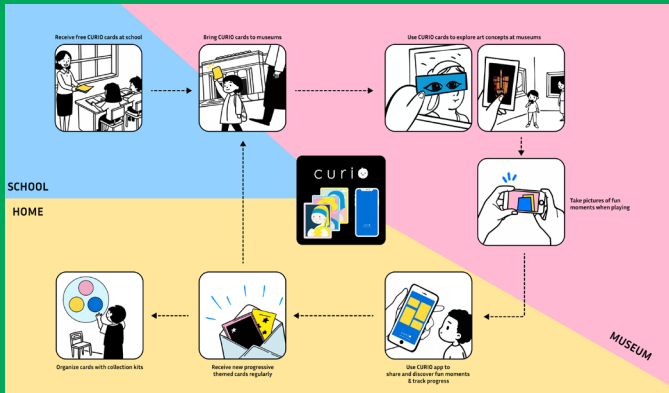
Key findings emerged from this event: some parents with very young children expressed uncertainty about the kit's age appropriateness, and boys seemed slightly less engaged than girls. Moving forward, varied entry points will be created to cater to different ages and interests, ensuring broader accessibility and appeal.

OUTCOME

The CurioLoop system integrates two primary components—CurioKit and CurioKid—to create a comprehensive and engaging family museum experience.

These tools are designed to work seamlessly together, empowering children to act as curators and transforming traditional museum visits into immersive, interactive, and collaborative explorations.

By bridging physical and digital interactions, CurioLoop fosters continuous family engagement with art both inside and beyond museum walls.



CurioKit

CurioKit is a tangible, paper-based toolkit that is lightweight, affordable, and designed for broad distribution in schools and communities. It serves as the foundation of CurioLoop, empowering children to take the lead during art museum visits.

The key feature of CurioKit is its see-through and co-creation design, which allows children to actively participate in interpreting and interacting with artworks. By matching, layering, or creating new pieces inspired by exhibits, CurioKit encourages a child-centered approach to exploration.



Key elements of CurioKit include:

- **Prompts for Exploration and Observation:** Simple, child-friendly instructions guide children to focus on specific visual elements such as colors, shapes, and textures, encouraging detailed observation and interpretation.
- **Tactile Interaction:** Interactive components, including transparent cards, holes, and layering tools, provide hands-on engagement that stimulates creativity and curiosity.
- **Portability and Accessibility:** Constructed from durable yet inexpensive materials, CurioKit is designed to be accessible to families across diverse socioeconomic backgrounds, ensuring inclusivity.

By fostering tactile engagement and providing clear prompts, CurioKit helps children build confidence and curiosity as they lead their families through museum visits, transforming the experience into a collaborative and educational journey.

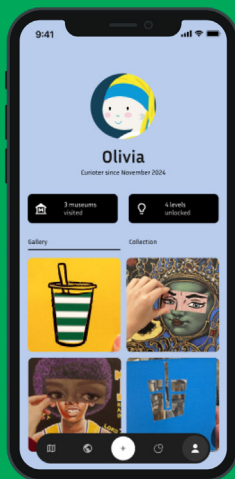
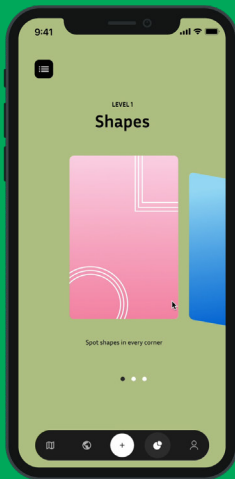
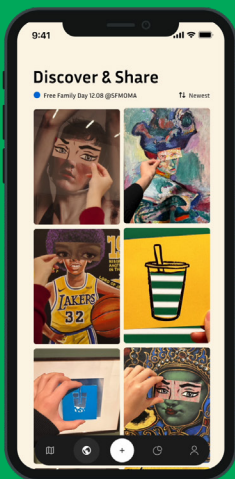


CurioKid

CurioKid is a child-centered app that complements CurioKit by offering families a digital platform to document, share, and extend their art exploration experiences. This component ensures that the engagement initiated through CurioKit continues beyond the museum visit.

Key features of CurioKid include:

- **Personalized Accounts:** Families can create profiles to upload photos of children’s artwork, archive co-created pieces, and document their experiences. These accounts serve as a digital scrapbook for revisiting and cherishing museum memories.
- **Public Gallery:** A shared digital space allows children to publish their creations, fostering a sense of community and encouraging inspiration among peers.
- **Access to Themed CurioKits:** Families can explore and order additional themed CurioKits tailored to specific age groups, museums, or artistic themes, encouraging further exploration at home or in other cultural spaces.





Building the Revisit Ecosystem

The transition from CurioMic to CurioKit integrated a simplified and more engaging design.

The accompanying CurioKid platform was designed to document family interactions, provide a space for sharing children's creations in a public gallery, and distribute additional themed CurioKits. Grounded in community-based learning theories, this ecosystem promoted long-term engagement with art museums [13].

Transformative Potential of Child-Led Engagement

This study underscores the transformative potential of empowering children as curators in cultural spaces, addressing the guiding research question of how hybrid tools can foster sustained engagement and enhance familial interactions. The findings align with experiential and child-centered learning theories, which emphasize active participation as a cornerstone of creativity and personal growth [14], [15]. Observed increases in children's confidence, curiosity, and leadership reflect the developmental benefits of participatory cultural engagement, as noted in prior research [16]. By fostering agency and self-expression, CurioLoop contributes to a reimagined model of cultural engagement, bridging the gap between traditional museum programming and contemporary family needs.

Impact of the Hybrid Approach

The hybrid approach of CurioLoop, which combines the physical CurioKit with the digital CurioKid platform, addresses critiques of traditional museum practices that often fail to maintain long-term audience engagement [17]. CurioKit provided hands-on interaction, allowing children to explore and interpret art in a tactile, engaging manner, while CurioKid sustained creative exploration by enabling families to document, revisit, and share their experiences. This dual approach ensures that the museum visit evolves into a continuous learning journey, promoting both short-term creativity and long-term community connection. Additionally, the system's emphasis on intergenerational collaboration demonstrated its potential to strengthen family bonds and encourage children to assume leadership roles.

DISCU

Leadership Development and Broader Implications

A particularly significant and unanticipated finding was the development of leadership skills in children. As children guided their parents through activities, they exhibited increased confidence and agency. This aligns with research indicating that participatory learning environments can cultivate responsibility and leadership in young participants [18]. These results suggest broader applicability of CurioLoop, including its potential adaptation for educational or community-based programs where collaboration and leadership development are primary goals.

Limitations and Future Directions

Despite its successes, this study faced limitations. Conducted in only three museums with a small, homogenous sample, the findings have limited generalizability [1].

CurioKid's digital dependency posed accessibility challenges for families without reliable internet, highlighting the need for offline-compatible features [28]. Ethical concerns, such as public sharing of children's contributions, require further exploration to ensure privacy and intellectual property rights.

Future research should expand CurioLoop's implementation to diverse cultural institutions, including rural communities, and test its scalability. Comparative studies with other hybrid models may reveal opportunities for innovation. CurioLoop redefines museums as inclusive hubs, fostering intergenerational creativity and lifelong cultural connections.

SSION

CurioLoop reimagines the family museum experience by seamlessly integrating physical and digital tools to empower children as curators and active participants in cultural spaces. The combination of the tangible CurioKit and the digital CurioKid platform transforms traditional museum visits into interactive, child-led journeys that extend into long-term engagement. This approach nurtures creativity, builds confidence, and fosters meaningful family interactions, creating a sustainable ecosystem for cultural exploration.

Through user testing and feedback, CurioLoop demonstrated the effectiveness of tactile prompts in sparking curiosity and creativity among children. The see-through and layering features of the CurioKit proved particularly successful in engaging children with artworks, encouraging detailed observation and imaginative responses. Families appreciated the flexibility of the toolkit, which facilitated shared exploration while respecting individual creativity. Additionally, the CurioKid platform extended the experience by allowing families to document their journeys, share creations in a public gallery, and access new resources, fostering a sense of community and ongoing interaction.

C O N C L

A significant finding was the emergence of children's leadership skills as they guided their parents through activities. This shift in family dynamics highlighted the educational potential of child-led exploration, encouraging co-learning and collaboration. Such outcomes underline the broader implications of CurioLoop for cultural and educational institutions aiming to engage young audiences.

Despite its successes, CurioLoop has limitations. The testing was conducted in a limited number of museums with a relatively small sample size, necessitating broader trials across diverse cultural and geographic settings. Additionally, the digital component's reliance on internet access poses challenges for some families, suggesting the need for offline-compatible features in future iterations. Expanding the system to include intergenerational tools for grandparents and other caregivers could further enhance its inclusivity and impact.

CurioLoop offers a scalable, adaptable model for transforming family engagement in cultural spaces. By positioning children as central contributors to cultural narratives, it ensures art museums remain relevant, vibrant, and accessible, inspiring future generations to explore, create, and connect. CurioLoop exemplifies how thoughtful design can reshape cultural experiences, fostering lifelong learning and community connections.

CONCLUSION

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