Executive Summary: Emerging Media Evaluation

For a number of years, the American Museum of Natural History (AMNH) has been expanding the use of a range of digital media in exhibition halls including augmented reality (AR), virtual reality (VR), interactive media, videos, data, and mobile applications. "Emerging media" is used as an umbrella term for the range of strategies to illuminate the natural history content and scientific processes for visitors. Evaluation sought to test these media in naturalistic settings, specifically addressing two main questions: 1) How do visitors use emerging media in galleries? 2) What do visitors understand from these media, in the context of the galleries?

The accompanying report presents complete results from an evaluation conducted by J. Sickler Consulting in 2019-20. The study used two methods, collected at five media-types: interactive collaborative VR, gestural interactive, 360 VR video, AR within Explorer App, and a touch table. The study collected unobtrusive observations of visitors using the media (n=242) and post-use interviews (n=192). This summary highlights the study's cross-cutting conclusions.

Emerging media were well-used by visitors, particularly by adults under 40 and children over age five.

While about 60% of individual visitors actively used a media piece when they encountered it, this was not even across demographic groups. Adults under 40 were significantly more likely to use media, and 80% of children 5 and older (or K-12 ages) used the media. T-Rex VR was used more often by adults (likely due to a strict age requirement) and Star Pose was used far more by children; adults saw it as being "for kids" and felt self-conscious posing. For media with a fixed run-time, groups nearly always stayed for the entire experience. At more flexible media, the average group did not stay for the full time, suggesting the flexibility of the interface was a factor in length of stay.

Visitors value both interactivity and immersion. Each medium has strengths to create portfolio of diverse media experiences.

VR and AR were good at creating immersion, giving visitors the feeling of being "really there." The gestural station and touch table were better at creating interactive experiences, responding to input from visitors. T-Rex VR showed the capacity of a media piece to incorporate both immersion and interactivity, and visitors responded positively to both qualities. In general, visitors are looking for the three Is: immersive, interactive, and informative; these were the qualities rated most important and identified as what was enjoyable in the media they used. In general, visitors aren't looking for games to play; rather, they are media that creates authentic experiences of ideas, places, and peoples.

A large majority of visitors were able to identify relevant content from media, but did not always get the full breadth of intended ideas.

While around 70% of visitors were able to identify content as a main purpose or takeaway from media, only about half of responses aligned with the content messages designers intended. Variation in these results by media seemed to be influenced by the specificity and complexity of topics in pre-set goals. Visitors were generally able to get high-level ideas from media, but fewer got more nuanced or specific concepts. Star Pose conveyed the main idea of showing constellations, while T-Rex VR users struggled to pick up on subtly presented bird-like behaviors. The Touch Table generated the fewest intended takeaways, but mostly because visitors' understanding stopped at comparing skeletons.

Visitors' level of prior knowledge may be a useful starting point for determining appropriate grain size for content goals.

Visitors' connections to prior knowledge shoed how visitors use their incoming frames of reference to interpret media. Star Pose, for example, leveraged widely-held knowledge (constellations), which likely aided visitors in identifying that main point. For the 360 Video VR, visitors had little knowledge of those exact topics, but they were able to find parallels with familiar topics (e.g., plate tectonics on Earth; pyramids in Egypt). These parallels helped them understand basic ideas, but were not advanced concepts. Media with focused, niche content and relatively short interaction times resulted in fewer visitors able to connect with prior knowledge.

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About one-third of visitors could connect media with ideas from the Hall; more were able to see a link with general types of objects on display.

A little more than half of groups were able to verbalize some connection between the media they used and the Hall it was in, but those connections were at a fairly surface level in many cases. About half of those groups (one-third overall) were able to name an idea or concept from the Hall that related to the media they used; the others named or pointed to artifacts that had a relationship (without naming the relevant idea). There is no baseline for this data, and it is difficult to assess how solidly visitors made connections (versus landing on a relatively general link). And while one of the more common suggestions visitors made for media was a request for additional content, those requests were interest in specific details or questions unique to an individual visitor.

Implications & Next Steps

Based on the findings and consideration of results with the AMNH team, several insights were gleaned to inform future directions.

- **For Experiential Media: Consider adding bite-sized content to draw attention to details that illustrate core ideas.** Visitors may need some footholds that help them notice content-relevant details in their environment. This might be minimally intrusive call-outs in the media to draw attention to details you hope they will notice. It could also be a pre- or post-use organizer with the fundamentals of what to look for or what one might have noticed and why it's important."

- **For Content-Rich Media: Be wary of getting too complex or having too many big ideas.** Particularly with topics that are widely unfamiliar, which is likely true for emerging scientific discoveries, prioritize a single "big idea," rather than the many potential related sub-themes. Data showed that visitors tend to be most successful at getting to that first step (e.g., "there are volcanoes on other planets, some made of ice"), rather than to next-level content (e.g., clues to evolution of bodies in space). With focus, more visitors may better understand the core idea.

- **Front-end and formative testing may help calibrate content goals.** Even small-scale prototype or concept testing with visitors can be very helpful in helping a team calibrate the appropriate focus and level of detail for content goals. Front-end testing may help understand common footholds or parallels that can be used as jumping-off points for new ideas. Formative tests may help find what types of "more content" visitors are curious about when looking at rough cuts or storyboards.

- **Intentional goal-setting – for content and experience – is an important early step and point to revisit during development.** Some of the successes and limitations related to the nature of media goals. For content, processes to articulate a "big idea" (Serrell, 2020) could help focus development and decisions of what to include. For experience, immersive and interactive media are both valued. Setting goals and selecting a medium suited to those goals should aid development. In addition, ensuring a diverse mix of experiences around the museum will help media maximize reach.

- **Seek opportunities to minimize limitations and incorporate universal design.** While the majority of visitors were able to use the media, there was evidence of factors that limited use. Issues of physical or mobility limitations, discomfort with "on stage" activities, and even vision concerns (with 3D headsets) all arose, in addition to care-taking concerns when groups had younger children. While some issues may not be solved for all visitors (and some will simply be disinterested), strategies to mitigate barriers could make media more inclusive.

- **Consider how we can learn from this study (from a pre-COVID museum) to keep interactivity and immersion in reopening.** Even before museums closed, the risk of public, high-touch devices shut down some of these media. This study may point to the potential for gestural or personal device technologies as ways museums can provide immersive and interactive media, even while we are cautious about shared surfaces. Rather than starting from scratch, AMNH's exploration of media may be a starting point for the post-COVID museum.