

Summative Evaluation of *The Universe In Your Hands*

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Background

The Universe in Your Hands: Early Tools of Astronomy, a new permanent exhibition of the Adler Planetarium and Astronomy Museum's collection of early astronomical instruments, opened in May of 1995 after three years of planning. With *The Universe in Your Hands* (TUIYH), the Adler's early instrument display has been renovated and re-contextualized to portray the social and scientific setting of the European and Islamic worlds during the Middle Ages (1200 to 1500 A.D.). TUIYH conveys ideas about how the universe was viewed by the monks, scholars, university students, farmers, and nobles who used three types of astronomical instruments: sundials, astrolabes, and armillary spheres. More than one hundred instruments are on view in an exhibit setting that intends to evoke the Middle Ages through an interactive medieval university classroom and reproductions of paintings and woodcuts showing people who made and used the tools. In addition, the exhibit offers many interactive and hands-on components to give visitors first-hand experience of how these tools were used.

The summative evaluation for TUIYH consisted of five separate studies that combined quantitative and qualitative, cognitive and affective, and behavioral data. The evaluation used a variety of techniques including unobtrusive observation ("tracking and timing"), cued and uncued interviews, and cued open-ended questionnaires. This thorough study into the behaviors, thoughts, actions, motivations, and feelings of visitors who encounter TUIYH gave the Adler a complete picture of what can happen in the exhibit, how it performs for a variety of visitors, and how visitors respond to its messages.

The five studies in this summative evaluation revealed both that TUIYH was a successful exhibit in many ways, and that there were places where it could have been improved to meet exhibit developers' goals more fully. Quantitative and qualitative data taken from these studies indicated that most visitors used the elements, engaged in positive behaviors and interactions, and that the exhibit had the ability to communicate important exhibit messages. The data also showed that lack of conceptual orientation at the exhibit exit affected how visitors behaved in TUIYH, and that visitors did not pay as close attention to the objects on display as developers expected.

Important Findings

- Visitor engagement increased in the renovated exhibit when compared to the former display of the historical instrument collection.

The old *Antique Instruments* hall had sequestered objects in cases and limited visitor interactions with exhibit materials primarily to looking and reading. Tracking showed that this environment did not tend to inspire visitors to stop and look at the cases of instruments, and at least half of the total sample strolled through the hall without stopping. Those who did stop did not spend much time. By contrast, TUIYH—which combined traditional object cases with free-standing interactives and large-scale, attractive interpretive graphics—did the opposite. Uncued visitors spent more time with its elements: they read, looked at objects, and used interactives. Cued visitors were able to articulate most of the important exhibit messages clearly and completely.

Results from the summative evaluation of TUIYH suggest that interpretation (how content was treated through context, ideas, graphics, and exhibit element formats) made the difference in visitor behavior. TUIYH attempted to bring its subject alive by emphasizing not only the aesthetic qualities of the instruments, but also by showing how human and cultural relationships shaped these instruments and their applications. Working models further encouraged visitors to interact with the instruments. As a result, tracking data from TUIYH showed a marked improvement over *Antique Instruments*: median time spent increased from two minutes to over six minutes, the variety of positive behaviors increased (visitors looked closely and read, but also talked, touched, and interacted), and the overall percentage of exhibit elements used increased from an average of 17% use to 27% use.

Built into the exhibit's design were two elements that served as "advance organizers;" they provided a conceptual introduction to TUIYH's most important messages. "Mystery Objects" encouraged visitors to look closely at the instruments, an important goal for exhibit developers. "Who Used These?" tried to bring the ancient instruments and their historical context alive by linking them to real people, another experience exhibit developers felt would be critical to spark visitors' interest in this seemingly arcane content. In fact, visitors who used these two "advance organizer" elements acted differently in the exhibit than those who did not stop there: they averaged more time spent in the exhibit and greater use of the total exhibit elements, as well as more reading, more looking at more objects, and greater use of interactive elements.

- Visitors in the tracking samples did not look closely at exhibit objects as often as exhibit developers might have liked.

When exhibit objects were paired with a hands-on interactive element, visitors tended to use the interactive without necessarily turning increased attention to the accompanying object. The design of TUIYH attempted to enhance the objects' aesthetic appeal with lush background colors and "boutique" lighting, yet it was only at the "Mystery Objects" case that visitors really looked closely and carefully at the

exhibit need to be designed specifically to elicit such overt behaviors (as was the "Mystery Objects" case), rather than relying on ambient design features.

- Lack of introductory information at the exhibit's exit decreased engagement for those entering the exhibit there.

A negative effect of the exhibit's design was evident among exit tracking visitors, who encountered neither a title nor introduction to the exhibit, nor any conceptual orientation. Visitors who came to TUIYH from its exit found themselves in the armillary sphere section, which both cued and control interview data had revealed to be the least accessible content. Unfamiliar subject matter (esoteric astronomy instruments) combined with a lack of exhibit introduction appeared to affect visitors going through TUIYH from its exit. Their behaviors indicated a different sort of engagement than was seen in the entrance sample: less time spent on average, less exhibit use on average, attention paid to different exhibit elements, more backtracking, and fewer visitors walking all the way through the hall. In this case, it seems that lack of orientation put these visitors at a disadvantage.

Exhibit developers knew that because of the ring-like shape of the Adler's third floor, many visitors would likely enter TUIYH at its exit; nevertheless, they decided not to include a title or introductory panel there. The summative evaluation indicates that this decision may have been a disservice to visitors. Visitors may have been easily disoriented and frustrated as they wandered through the hall, not knowing where they were, what the objects were, or in what thematic context the objects belonged. A title panel and introductory materials may have made a difference in visitors' level of engagement with exhibit elements and messages.

- TUIYH has the potential to communicate developers' messages.

Both cued questionnaire and interview data indicated that a visitor who agreed to look at the exhibit for at least ten minutes could walk away with a solid understanding of the instruments, how they were used, and the culture of the people who made and used them. Responding to open-ended questions, visitors used their own words to describe the exhibit in ways that both made sense to them and also corresponded to the language and intent of the exhibit's communication goals. Personal associations and explanations did not interfere with how visitors understood the exhibit and, in some cases, enhanced their synthesis of these ideas.

Baseline data from the control interview (a sample of visitors who had not seen TUIYH) indicated that Adler visitors did not necessarily enter with much understanding of or experience with the instruments or their cultural context. Although most visitors were familiar with sundials (by far the simplest instrument), they were very unfamiliar with the

more uncommon astrolabes and armillary spheres. Cued by certain physical characteristics, visitors who had *not* seen the exhibit could make educated guesses about the instruments, but most of their responses were neither detailed nor self-assured: they did not seem to be drawing on prior knowledge. Considering the complexity of these esoteric instruments, control interview visitors did well, but when they were compared to cued interview visitors who *had* seen the exhibit, important differences emerged.

Many more cued than control interview visitors could demonstrate or describe *in detail* how the instruments worked, and could also express related ideas. Even cued interview visitors who began by saying, "I didn't understand this one" launched into fairly complete and appropriate descriptions of how they had used an astrolabe or armillary sphere in the exhibit. Some cued interview visitors were rated "Low," yet all were able to express at least one relevant concept regarding the instruments. In the control interview sample, a small proportion of visitors (12% each) were not able to do this for the astrolabe and armillary sphere.

- Visitors did not respond to the historic individuals highlighted in the exhibit.

TUIYH developers wanted visitors to connect to the instruments through actual historical people, and so a great deal of the interpretive graphics and text presented names, stories and pictures of actual people who were known to have used the instruments. The "Who Used These" case was built specifically to illustrate this connection and was given a prominent place near the exhibition entrance. Yet in both cued questionnaire and interview data, visitors made few mentions of specific individuals cited in the exhibit, although they regularly referred to "people" in general.

Visitors' cognitive and affective responses indicated that they understood and appreciated the human context presented in the exhibit, but very few visitors went beyond this to mention individuals who were highlighted as instrument makers or users. The theory that visitors will respond to unfamiliar content more readily when a specific, "real" human face is associated with that content is a familiar one to museum practitioners, and was especially important to TUIYH's developers. Yet the summative evaluation data indicated that developers could have done more in the exhibit to help visitors relate to the stories of these individuals. On the other hand, the fact that visitors *did* talk about and appear struck by the human context in general (including the medieval cultural context), may indicate that the combined emphases on human connections to these instruments made the point adequately enough.

A Critical Link between Exhibit Planning and Evaluation

Developers spent a great deal of time focusing and articulating primary exhibit messages, and, with the help of formative evaluation, worked out carefully how these mes-

sages would be embodied in TUIYH's elements and experiences. Traditional interpretive graphics combined with hands-on experiences gave visitors a choice in how to approach content and provided complementary experiences that reinforced understanding. Introductory experiences turned out to be critical to visitors' subsequent responses to the rest of the exhibit.

The strength of TUIYH's communication plan made interpretation of summative evaluation data easier, because it clearly implied certain desirable outcomes and made it possible to judge how completely those outcomes had been realized. By thinking about the visitors' experience during exhibit planning, developers kept goals realistic and main messages limited to a few important ideas that could be interwoven in a variety of ways throughout the exhibit. Examining visitor language from interviews and questionnaires, evaluators saw many of the same words, phrases, thoughts, and feelings that exhibit developers had used and intended to communicate. This outcome showed that in TUIYH, ancient instruments of astronomy and the ideas they embodied were made truly appealing, accessible, and interesting to today's museum goers.

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Catching Visitors in Your Web

Mark Hayward

International Museum of Surgical Science

Web sites come a dime a dozen. We approached the challenge of developing ours with the idea that a small focused site, emphasizing fun and interaction, would have the best chance of reaching the broadest possible audience, including the "international" public that we seek to serve. After all, what is the point of producing and maintaining a site that doesn't get used? From our perspective as a small, relatively obscure museum we took the attitude that numbers are king.

The form that such a site would take was not readily apparent. After numerous brainstorming sessions we arrived at the conclusion that a historical narrative that placed the visitor as the main character would best fit our goals and resources. This story would occupy about 80% of the entire site and be layered with a blend of humor and medical history. We wanted visitors to be drawn in by the narrative so that we could periodically interject the historical information we wished to convey.

None of us had the computer expertise to construct the site in-house. Budget was a major restriction on the project, so we contacted several Web site design firms early on. The firm we chose, Frontline Design, seemed most receptive to our project goals and budget restrictions. They examined the content we developed and suggested several format options. We chose to use the "frames" feature of Netscape and Microsoft Explorer, which allows visitors to move back and forth between the main subject area "Interactive Antique Illness" and a set of supporting "footnotes" without changing screens. A navigational bar would appear at the top of the screen throughout the site that would allow visitors to move through it at will. (See Figure 1.)

Frontline not only constructed our site but also maintains it. Part of this package includes a monthly report evaluating visitor activity based on a number of criteria such as: most requested pages, most active countries, most active days of the week, most active hours of the day, U.S. cities. This evaluation was a key factor in our choice of firms. We use the summary to evaluate our initial premise for the site and to track the breadth of the audience being reached. The home page of the site includes a feature that has also been very useful. The introduction that links you to the "Interactive Antique Illness" reads:

Experience our INTERACTIVE
ANTIQUÉ ILLNESS and step back in
time to the 1800s to become one of ###
people who have survived or one of ###
people who have died on this Web site.