



**Museum Visitor Studies, Evaluation & Audience Research**

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**Summative Evaluation  
of  
*CSI: The Experience***

*Prepared for*  
**Fort Worth Museum of Science and History  
Fort Worth, TX**

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# EXECUTIVE SUMMARY

## INTRODUCTION

With funding from the National Science Foundation (NSF) and the Science Museum Exhibit Collaborative (SMEC), the Fort Worth Museum of Science and History (FWMSH) developed *CSI: The Experience*, an exhibition and Web Adventure focused on forensic science. While the project was, in large part, developed and managed by FWMSH, many other for-profit and non-profit organizations contributed to the development of the exhibition and Web Adventure, including Rice University, Columbia Broadcasting System (CBS), and the American Academy of Forensic Sciences (see Appendix A for a list of project partners). Randi Korn & Associates, Inc. (RK&A) was contracted to conduct a summative evaluation that explored visitors' overall experiences, understanding of forensic sciences, and the research question "Does the *CSI: The Experience* Web Adventure extend exhibition visitors' learning of forensic science?" RK&A also conducted a process evaluation that explored the effectiveness of the *CSI* project and collaboration model.

**The findings presented here are among the most salient. Please read the body of the report for a more comprehensive presentation of findings.**

## PRINCIPAL FINDINGS: TIMING AND TRACKING OBSERVATIONS

RK&A conducted a total of 98 observations of visitors 9 years and older between October and November 2008.

### DEMOGRAPHIC CHARACTERISTICS AND BACKGROUND INFORMATION

- ◆ Visitors were almost evenly divided by gender.
- ◆ The sample was predominantly adults, 18 years and older.
- ◆ Most visitors were attending the exhibition with a group of adults or a group of adults and children.

### VISITATION PATTERNS AND BEHAVIORS

- ◆ Time spent in the exhibition ranged from 17 minutes to over two hours, with a median time of approximately 41 minutes.
- ◆ Nearly all visitors stopped at all exhibits that were part of the prescribed experience (those necessary for collecting evidence).
- ◆ The five exhibits that visitors spent the most time at are the three Crime Scenes, Briefing Area, and Report to Grissom, with nearly all visitors stopping at the Briefing Area and Report to Grissom.
- ◆ Visitors spent the least amount of time at supplemental exhibits, those not necessary for collecting data.

- ◆ Grissom’s Office was the most stopped at supplemental exhibit; one-third of visitors stopped there.
- ◆ Nearly all visitors interacted with other visitors.
- ◆ Nearly all visitors who interacted with others did so within their group, and a few interacted with strangers.

## PRINCIPAL FINDINGS: RUBRIC-SCORED EXHIBITION-ONLY AND EXHIBITION & WEB INTERVIEWS

Ninety-nine interviews were scored using a rubric (see pages 24-26). Of these, 50 were conducted with individuals after they visited the *CSI: The Experience* exhibition (Exhibition-only) and 49 were conducted with individuals after they visited the exhibition and solved the Web Adventure on the *CSI: The Experience* Web site (Exhibition & Web).

### DEMOGRAPHIC AND VISIT CHARACTERISTICS

- ◆ Slightly more than one-half of participants are female.
- ◆ Approximately one-half of participants are children (9-17 years) and participants’ ages range from 9 to 68 years.
- ◆ Nearly all participants are Caucasian/white.
- ◆ About three-quarters of participants had visited science museums at least twice in the last year.

### ACHIEVEMENT OF *CSI: THE EXPERIENCE* OBJECTIVES

In this section, Exhibition-only and Exhibition & Web interviewees’ achievement of five *CSI: The Experience* objectives (see below) are presented *quantitatively* within the framework of a scoring rubric with a 4-point scale: 1 = below beginning, 2 = beginning, 3 = developing, and 4 = accomplished.

**TABLE A**  
**CSI/ OBJECTIVES**

OBJECTIVES
1) Visitors will use and recognize the process of scientific inquiry.
2) Visitors will understand that forensic science is the application of the scientific process to solve crimes.
3) Visitors will understand the scientific principles underlying the different areas of forensic science.
4) Visitors will understand the role technology played in their ability to solve the crime and recognize that technology plays a significant role in forensic science investigations.
5) Visitors will understand the role human judgment plays in the conjunction with advances in technology.

Interviewees’ achievement (rubric score) was tested by interview group, age (adult or child), and science museum visitation.

- ◆ All objectives: interviewees in both groups scored, on average, between 2 (beginning) and 3 (developing) and had a statistically similar mean score for all objectives except Objective 3 (see Table 20 in the body of the report).

- ◆ Objective 3: Exhibition-only participants had significantly higher mean scores in their understanding of scientific principles underlying the different areas of forensic science than did Exhibition & Web participants (mean = 2.63 vs. mean = 2.02) (see Table 20 in the body of the report).
- ◆ Objectives 2-5: adult participants had significantly higher mean scores than did child participants (see Tables 22-25 in the body of the report).
- ◆ Objective 2: participants who were more-frequent science museum visitors had a significantly higher mean score in their understanding of forensic science as the application of the scientific process to solve crimes than did participants who were less-frequent science museum visitors (4+ visits, mean = 2.50 vs. 2 - 3 visits, mean = 2.19 vs. 0 - 1 visits, mean = 2.04).

## PRINCIPAL FINDINGS: WEB-ONLY INTERVIEWS

Twenty interviews were conducted with individuals after they used the *CSI: The Experience* Web Adventure (Web-only). The sample of Web-only interviewees was too small for a quantitative comparison with the Exhibition-only and Exhibition & Web interview groups. Instead, Web-only findings are presented *qualitatively* within the framework of the scoring rubric (see pages 24-26).<sup>1</sup>

### DEMOGRAPHIC AND VISIT CHARACTERISTICS

- ◆ Most interviewees are adults, and interviewees' ages range from 10 to 63.
- ◆ About two-thirds are female and Caucasian/white.
- ◆ About two-thirds have visited a science museum one to three times in the last year.

### ACHIEVEMENT OF *CSI: THE EXPERIENCE* OBJECTIVES

In this section, Web-only interviewees' achievement of five *CSI: The Experience* objectives are presented *qualitatively* within the framework of a scoring rubric with a 4-point scale: 1 = below beginning, 2 = beginning, 3 = developing, and 4 = accomplished (see pages 24-26).<sup>1</sup>

- ◆ Objective 1: approximately one-half of interviewees achieved a developing level in their use and recognition of the scientific inquiry process, and one-third achieved a beginning level.
- ◆ Objective 2: slightly more than one-third of interviewees achieved a beginning level in their understanding of forensic science as the application of the scientific process to solve crimes, and about one-third achieved a developing level.
- ◆ Objective 3: one-half of interviewees achieved a beginning level in their understanding of scientific principles underlying the different areas of forensic science, and one-quarter achieved a developing level.
- ◆ Objective 4: slightly less than two-thirds of interviewees achieved a developing level in their understanding of the role technology plays in forensic science investigations, and one-quarter achieved a below beginning level.
- ◆ Objective 5: slightly less than one-half of interviewees achieved an accomplished level in their understanding of the role human judgment plays in conjunction with advances in technology.

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<sup>1</sup> Please see "Limitations" in the report methodology.

## PRINCIPAL FINDINGS: QUALITATIVE ANALYSIS OF IN-DEPTH INTERVIEWS

Specific aspects of all 119 interviews (Exhibition-only, Exhibition & Web, and Web-only) were analyzed *qualitatively*. These findings present aspects of visitors' overall experience—overall opinions of the exhibition and Web Adventure, visit motivation, and perceived overall message of *CSI: The Experience*.

### OVERALL OPINIONS OF *CSI: THE EXPERIENCE*

- ◆ Many interviewees, whether discussing the exhibition and/or Web Adventure, said they enjoyed learning about the different techniques used to solve crimes and participating in a realistic, immersive experience.
- ◆ Some interviewees who used the Web Adventure (Exhibition & Web and Web-only) had difficulty navigating the game and often described “getting stuck” and having to repeat steps to move forward.
- ◆ Some Exhibition & Web interviewees drew comparisons between the two experiences—several said they liked that the exhibition had more directional support whereas several said they liked that the Web Adventure was more challenging.

### WHAT ATTRACTED VISITORS TO *CSI: THE EXPERIENCE*

- ◆ About two-thirds of all interviewees said they were attracted to the exhibition and/or Web Adventure because of some combination of their interest in *CSI: Crime Scene Investigation*, the television show, and solving mysteries or crimes in general.

### PERCEIVED OVERALL MESSAGE OF *CSI: THE EXPERIENCE*

- ◆ When asked what they thought the exhibition and/or Web Adventure were about, most interviewees mentioned something about solving crimes.
- ◆ About one-half of interviewees said the exhibition and/or Web Adventure were about how forensic scientists solve crimes and the different sciences that go into crime investigation.
- ◆ About one-half of interviewees were less specific, stating that the exhibition and/or Web Adventure were about giving visitors the opportunity to use clues or evidence to solve crimes or mysteries.

## PRINCIPAL FINDINGS: PROCESS EVALUATION

RK&A conducted a process evaluation to document the effectiveness of the *CSI* project partnership and examine the project's collaboration model. These findings present partners' thoughts and ideas elicited through a facilitated group discussion and in-depth interviews.

### PARTNERS' UNDERSTANDING OF PROJECT GOALS AND THEIR PROJECT ROLE

- ◆ When asked about the goals of the *CSI* project, there was general consensus among partners—the project is meant to provide people with fun and engaging real-world science experiences.
- ◆ Most partners said the *CSI* project fit in with their organization's mission—for instance, by using technology to enhance learning, engaging people in science learning and inquiry, or communicating information about forensic science or scientific careers.



## ACHIEVEMENT OF PROJECT GOALS

- ◆ When asked whether the *CSI* project had achieved its goals, nearly all partners agreed it had done so; some said the project achieved the broader goal of entertaining audiences while providing a hands-on, authentic science-learning experience, while others said the project was successfully designed to accommodate the target audience's learning.

## STRENGTHS OF THE COLLABORATION

Project partners identified the following key strengths of the *CSI* collaboration model:

- ◆ The high caliber of resources and expertise contributed by each partnering organization and a clear definition of partners' roles by these unique qualities (e.g., a project partner who has the expertise to navigate between the non-profit and entertainment/for-profit worlds).
- ◆ Clearly outlined project elements, such as goals and timelines, and partners' commitment to these goals.
- ◆ In-person meetings with various partners in the beginning phases of the project to establish rapport.
- ◆ Frequent and open communication throughout the project; effective phone and e-mail communication helped project goals progress despite geographic distance.

## CHALLENGES OF THE COLLABORATION

Project partners identified the following challenges of the *CSI* collaboration model:

- ◆ Working with an accelerated timeline, which affected partners' ability to complete specific tasks, such as formative evaluation.
- ◆ Establishing effective partner communication given the number of partners involved and the geographic distance between partners.
- ◆ Balancing partners' needs, perspectives, and agendas with regard to project scope and priorities, something that was exacerbated by the number of collaborators and communication challenges.

## SUGGESTIONS FOR FUTURE COLLABORATIONS

Project partners suggested the following strategies for future collaborations:

- ◆ Clearly define project goals and timelines and partners' roles early in the collaboration process (e.g., appointing a liaison who communicates with and bridges the gap among project partners).
- ◆ Choose collaborators in relation to clearly articulated project goals, and be sensitive to each partners' diverse perspective.
- ◆ Convene face-to-face gatherings to establish trust and confidence among collaborators.
- ◆ Consider partnering with collaborators from different sectors (e.g., the entertainment industry) as it can provide increased project visibility.

# DISCUSSION

## INTRODUCTION

*CSI: The Experience (CSI)*—a NSF- and SMEC-funded exhibition and online gaming experience designed to promote interest in and facilitate learning of forensic science—was an extremely ambitious project developed through a unique collaboration among the Forth Worth Museum of Science and History (FWMSH) and project partners in the non-profit, academic, and for-profit sectors (see Appendix A for a list of partnering organizations). This project was also unique because it offers an online gaming experience that mirrors and expands on the exhibition experience in an attempt to extend visitors' experiences and learning.

Findings show that *CSI*'s two experiences—an exhibition and a Web Adventure—successfully engaged visitors and facilitated learning of forensic science, each at different levels; however, while these two experiences were successful independently, findings show that the Web Adventure experience did not extend exhibition visitors' learning of forensic science concepts. The following discussion explores: (1) the extent to which each experience successfully engaged visitors and facilitated learning of forensic science, and (2) *why* the Web Adventure experience may not have extended science learning.

### 1a. *CSI: THE EXPERIENCE EXHIBITION*

#### PREPARING EXHIBITION VISITORS FOR LEARNING

*CSI: The Experience* was an enjoyable and engaging exhibition for most visitors. Interviewees enjoyed learning about the different techniques used to solve crimes and participating in a realistic, immersive experience. Findings demonstrate that the exhibition model was successful, and RK&A attributes this success to defined entry points. As many practitioners and researchers know, entry points are vital to communicating science to the lay public. An entry point is a platform of familiarity that increases visitors' comfort, allowing them to engage more fully with an exhibition. Entry points are known to be highly effective in facilitating visitors' learning (McLean, 1993; Bruner, 1960). *CSI* is successful because it gives visitors *two* discernible entry points from which to experience the exhibition: (1) the *CSI* television brand and (2) a recognizable problem to solve and the tools and support needed to solve it.

#### **ENTRY POINT ONE: THE *CSI* BRAND**

The *CSI* television brand served as a way to attract visitors to the exhibition—about two-thirds of exhibition visitors were motivated to visit the exhibition because of some combination of their interest in the television show and solving mysteries or crimes in general. This was anticipated by partners, many of whom stated in the process evaluation findings that they felt the *CSI* brand was beneficial for increasing the project's visibility and potential audience. In an evaluation of a children's exhibition about math, RK&A found that using a popular children's television show as an entry point gave visitors the advantage of knowing the show's thesis—using math to solve problems (RK&A, 2008). The *CSI* brand likely provided visitors with a similar advantage.

#### **ENTRY POINT TWO: DESIGNING A PURPOSEFUL EXHIBITION**

The *CSI* design is unusual for a science exhibition in that it is a prescribed experience—it assigns each visitor a specific role and purpose (i.e., Crime Scene Investigator and a specific crime to solve). While in the exhibition, visitors are given explicit instructions about their purpose through the introductory film. The handout and crime scene also served as ways to prepare and orient visitors for their role as a Crime

Scene Investigator; providing an orientation is one strategy for helping visitors enter into and engage with an experience (RK&A, 2001; Ausubel, 1960).

Observation data demonstrate that *CSI: The Experience*'s prescribed experience was effective. Visitors spent a median of 41 minutes in the exhibition, an unusually long time for most science museum exhibitions. In addition, nearly all visitors stopped at all exhibits that are part of the prescribed experience (those necessary for collecting evidence). Further, having a problem to solve also seemed to encourage visitors to work together to achieve a common goal—something that FWMSH hoped would happen. Notably, nearly all visitors interacted with others, and while most interactions were within their visiting group, 14 percent of visitors interacted with visitors outside their own group.

## EXHIBITION VISITORS' LEARNING OF FORENSIC SCIENCE

Another goal of *CSI* was to facilitate learning of forensic science. Overall, approximately one-half of interviewees understood the exhibition's overall message as about how forensic scientists solve crimes and the different sciences required to support crime investigation. Additionally, because the effect of an exhibition on visitors is extremely variable, and subtle differences are often difficult to detect, RK&A employed a scoring rubric to assess visitors' understanding of five forensic science concepts presented in the exhibition on a scale from 1 (below beginning) to 4 (accomplished).

Not surprisingly, adults scored significantly higher than children on four of the five objectives. Nevertheless, on average, Exhibition-only interviewees scored in the middle of the rubric between 2 (beginning) and 3 (developing) for all five objectives, and, as is typical, a relatively smaller portion of interviewees scored at the accomplished level. At first glance, these scores may seem low and discouraging, but indeed they align with the learning we typically find in informal learning environments (RK&A, 2009; RK&A, 2007). It would be unrealistic for any exhibition experience to affect visitor learning in such a way that *all* visitors score at the highest level of a rubric (though some certainly did), because people begin with different levels of forensic science knowledge. Exhibition-only visitors' average rubric scores suggest an early understanding—that point at which a learner experiences an “ah-ha” moment. This may mean visitors moved from knowing very little to having a more informed, if still limited, understanding.

## Ib. *CSI: THE EXPERIENCE* WEB ADVENTURE

### PREPARING WEB USERS' FOR LEARNING

Since this study primarily explored the exhibition experience and whether the Web Adventure extended exhibition learning, findings that highlight the Web Adventure as an independent experience are less in-depth and concrete due to the small sample size. That being said, we can still speak, to some extent, about users' experience and learning as it relates to the Web Adventure. For instance, many Exhibition & Web interviewees and Web-only interviewees described their overall online experience as enjoyable and engaging; similar to Exhibition-only visitors, these interviewees enjoyed their online experience because they were afforded the opportunity to participate in a realistic, immersive experience and learn more about the different procedures involved in collecting evidence and solving crimes.

The study's sample of online users includes those who were recruited to use the Web Adventure and those who used the Web Adventure unprompted. A subtle yet distinct difference emerged between these two groups. While recruited users described their overall experience as enjoyable and engaging, some described “getting stuck” and having to repeat steps to move forward online, a frustration not encountered by the small sample of unprompted users. In fact, a few unprompted users expressed a desire for the Web Adventure to be more challenging (e.g., they wanted more evidence to sort through),

and several recruited users appreciated that the Web Adventure covered topics in greater depth and gave them more opportunities to “figure things out.” Further, Web developers received many unsolicited positive comments from Web Adventure users’ who expressed a desire for other, more challenging experiences (see Appendix B for a selection of these comments).

Not surprisingly, these findings suggest that the Web Adventure was very successful at engaging some users in *CSI* but not others. In other words, some people preferred the exhibition as a way to experience and learn about forensic science and some preferred the Web Adventure. These findings support the notion that people experience and learn in different ways (Gardner, 2006), a challenge that FWMSH and its partners met by developing a complimentary modality that supports individuals inclined to learn from virtual experiences.

The Web Adventure experience provided additional access to *CSI* for those not inclined or unable to experience the exhibition, and many of the reasons suggested for the exhibition’s success also hold true as possible reasons for the Web Adventure’s success. For example, the Web Adventure incorporated the *CSI* television brand and gave visitors a specific role and purpose that served as entry points for their experience. While the exhibition was a prescribed, guided experience, the Web Adventure was an open-ended experience—a difference that may well explain why some individuals felt more comfortable with one versus the other.

## WEB USERS’ LEARNING OF FORENSIC SCIENCE

Similar to Exhibition-only visitors, this study also explored Web-only interviewees’ understanding of five forensic science concepts presented in the Web Adventure.<sup>2</sup> The majority of Web-only interviewees demonstrated a beginning to developing level of knowledge of the five forensic science concepts. As with Exhibition-only interviewees, this result suggests an early understanding—that point at which a learner experiences an “ah-ha” moment and may mean that users moved from knowing very little to having a more informed, if still limited, understanding. While outside the scope of this study, it is also interesting to note that many of the unsolicited comments collected via the Web site mentioned that the Web Adventure sparked their own or a child’s interest in exploring a career in forensic science (again, see Appendix B for a selection of these comments). Based on information collected via the Web site, Web developers discovered that 62 percent of Web Adventure users discovered the site through school; thus, the Web Adventure may be well positioned to have a positive influence on young people.

## 2. EXTENDING EXHIBITION VISITORS’ LEARNING

RK&A explored whether the online gaming experience extended exhibition visitors’ learning of forensic science by conducting in-depth interviews with two visitor groups: individuals who visited the *CSI: The Experience* exhibition and individuals who visited the *CSI: The Experience* exhibition and used the *CSI: The Experience* online gaming experience.<sup>3</sup> When interview data from both visitor groups were scored using a rubric and the groups’ mean scores were compared, almost no statistically significant differences were found in visitors’ demonstrated knowledge of relevant forensic science concepts.<sup>4</sup> At first glance, these

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<sup>2</sup> Please note two differences with regard to the Web-only sample: (1) Web-only interviews were analyzed *qualitatively* within the framework of the rubric (as opposed to rubric-scored) and (2) most interviewees are adults ( $n = 18$ ).

<sup>3</sup> RK&A intended to explore the differences between three groups; however, we were unable to attain an adequate number of Web-only participants to conduct statistical analysis so we conducted a qualitative comparison.

<sup>4</sup> For Objective 3—visitors will understand the scientific principals underlying the different areas of forensic science—Exhibition-only participants had significantly higher mean scores than did Exhibition & Web participants. However, RK&A attributes this difference to the time-lapse between Exhibition & Web visitors’ experiences and their interview (please see “Limitations” in the methodology section).

findings suggest that the Web Adventure experience did not extend exhibition visitors' learning of forensic science concepts. While we cannot definitively say why this happened, we can speculate as to possible factors that may have influenced this outcome.

First, RK&A *prompted* Exhibition & Web visitors to use and complete the Web Adventure. This directive is significant because there is no way to know whether these visitors would have chosen to use the Web Adventure unprompted. We know, however, that of the individuals RK&A was able to reach for a telephone interview, approximately two-thirds declined to participate, citing lack of interest or a failure to complete the Web Adventure due to technological or navigational issues. Further, some interviewees who eventually completed the Web Adventure had difficulty advancing in the game and often described "getting stuck" and having to repeat steps to move forward. These findings suggest two factors that may have contributed to the lack of difference in visitors' demonstrated level of forensic science knowledge: (1) the Web Adventure's usability and (2) peoples' level of interest in an online gaming experience.

### THE WEB ADVENTURE'S USABILITY

The Web Adventure was lengthy and complex, and some visitors encountered technological glitches (e.g., problems loading the game, saving the game, etc.); while the interviewees in our sample of Exhibition & Web visitors persevered to solve the crime, they struggled. Encountering usability issues may have interfered with interviewees' ability to absorb the content presented as they devoted much of their energy to navigating the Web Adventure as opposed to focusing on forensic science concepts presented. As noted in visitor studies literature, museum visitors often have difficulty focusing on complex ideas when their basic needs have not been met (e.g., feeling oriented) (Leinhardt and Knutson, 2004; Rand, 2001). Notably, web developers were informed of these struggles along the way and responsive to users' needs. For example, there is now a new Web Adventure with a lower level of difficulty<sup>5</sup> and additional directional support on the Web Adventure's log-in page. While we cannot say how these changes have affected the user experience, it demonstrates developers' willingness to learn from users' experiences and adapt the Web Adventure experience as necessary.

### MUSEUM VISITORS' LEVEL OF INTEREST IN AN ONLINE GAMING EXPERIENCE

Another factor worthy of exploration is museum visitors' level of interest in online gaming experiences. Findings suggest a low level of interest from those recruited to use the Web Adventure that certainly may have affected how closely interviewees attended to the Web Adventure experience. Yet, the study's sample may not be a true reflection of the Web Adventure's online audience. Initially, RK&A intended to recruit Web-only participants who found and completed the Web Adventure on their own so as to sample only intrinsically motivated individuals. Because the response rate was low, RK&A resorted to recruiting participants at the Science Museum of Minnesota in addition to continuing to recruit users online. Thus, only one-half of Web-only interviewees used the Web Adventure *unprompted*, and, as already mentioned, all Exhibition & Web interviewees were *prompted* to use the Web Adventure. As mentioned previously, however, Web Adventure developers received many unsolicited positive comments from individuals who used the Web Adventure unprompted, but those individuals chose not to participate in the study (see Appendix B for a selection of these comments). Thus, while findings suggest the possibility that *CSI: The Experience* exhibition visitors may be less intrinsically motivated to explore online games, the Web Adventure seems to have the potential for success with a less traditional museum audience.

Online gaming is rising in popularity as one way for museums to engage a different audience. Still unclear is to what extent science museum visitors mirror online gamers in their learning preferences.

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<sup>5</sup> The new Web Adventure is not part of this evaluation.

While this study suggests a possible disinterest in or discomfort using the Web Adventure among museum visitors, further research is needed to fully understand the similarities and differences between learning preferences of museum visitors and gamers and whether an online gaming experience can realistically extend an exhibition experience. It may be that museum resources are best used for the development of online gaming experiences that are intended as a separate learning tool for non-traditional museum audiences.

## QUESTIONS FOR FURTHER EXPLORATION

While some findings in this evaluation are unexpected, we have learned a significant amount through this study, and it has generated many legitimate research questions including:

- ◆ Are museum audiences and online gaming audiences similar in how they prefer to learn?
  - ❖ How do they compare demographically (e.g., gender, age, education)?
  - ❖ How do their leisure interests compare (i.e., what types of leisure activities does each group prefer)?
  - ❖ How do their learning styles compare (i.e., how does each group prefer to learn)?
- ◆ What kind of online environment is appropriate for people who value museum experiences?
  - ❖ Could the existing Web Adventure serve well as an introduction to the exhibition?
  - ❖ Does a different kind of Web experience need to be designed?

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# INTRODUCTION

With funding from the National Science Foundation and the Science Museum Exhibit Collaborative, the Fort Worth Museum of Science and History (FWMSH) developed *CSI: The Experience*, an exhibition and Web Adventure focused on forensic science. While the project was, in-large, developed and managed by FWMSH, many other for-profit and non-profit organizations contributed to the development of the exhibition and Web Adventure, including Rice University, Columbia Broadcasting System (CBS), and the American Academy of Forensic Sciences (see Appendix A for a list of project partners). Randi Korn & Associates, Inc. (RK&A) was contracted to conduct a summative evaluation as well as a process evaluation for the project.

Guiding the summative evaluation of *CSI* is the research question, “Does the *CSI: The Experience* Web Adventure extend exhibition visitors’ learning of forensic sciences?” Based on this question, the summative evaluation explored:<sup>6</sup>

- ◆ Visitors’ motivations for visiting the exhibition and Web Adventure;
- ◆ Visitors’ understanding of *CSI: The Experience*’s overall message: forensic science utilizes scientific inquiry to solve crimes;
- ◆ Visitors’ affective experiences in the exhibition and using the Web Adventure;
- ◆ Whether differences in experiences existed among three visitor groups—those who visited the exhibition, those who used the Web Adventure, and those who did both;
- ◆ Total time spent in the exhibition and at individual exhibits; and,
- ◆ Visitors’ interactions with others in the exhibition.

Further, RK&A conducted a process evaluation that explored the effectiveness of the *CSI* project and collaboration model, and in turn, also helped contextualize the findings of the summative evaluation.

## METHODOLOGY

RK&A selected three methodologies to be used in the summative and process evaluations: timing and tracking observations, a facilitated group discussion, and in-depth interviews.

### TIMING AND TRACKING OBSERVATIONS

Visitor observations provide an objective and quantitative account of how visitors behave and react to exhibition components. Observational data indicate how much time visitors spend in the exhibition and suggest the range of visitor behaviors.

RK&A conducted timing and tracking observations at Science Museum of Minnesota (SMM) between October and November 2008. Visitors 9 years and older were eligible to be unobtrusively observed in the exhibition. The data collector selected visitors to observe using a continuous random sampling method. In accordance with this method, the data collector imagined a line outside the Briefing Area, before the station where visitors received clipboards and handouts, and selected the first eligible visitor to cross this imaginary line for observation. Once the visitor entered the Briefing Area, the data

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<sup>6</sup> See page 44 for objectives of the process evaluation.



collector started her stop watch and followed the selected visitor through the exhibition, recording the exhibits used, noting select behaviors (e.g., use monitors), and logging total time spent in the exhibition (see Appendix C for the observation form). When the visitor completed his or her visit, the data collector returned to the entrance to await the next eligible visitor to cross the imaginary line.

### FACILITATED GROUP DISCUSSION

Discussion groups are a qualitative research method in which a limited number of participants engage in roundtable discussions about topics presented by a moderator. The discussion group methodology was selected as the best way to capture partners' thoughts, feelings, and perceptions of the *CSI* project and collaboration model at the beginning of the project (phase one).

RK&A facilitated a discussion group with representatives from organizations collaborating on the *CSI* project who attended an advisors' meeting at FWMSH (see Appendix D for a list of participants). The group was held in Fall 2007, at which time the project had just started and partnering organizations were becoming acclimated with their project roles. The discussion group met for 90 minutes and RK&A facilitated the conversations using a discussion group guide (see Appendix E). Throughout the conversation, RK&A encouraged participants to be candid and honest in their responses. The conversation was audio-recorded with partners' knowledge and transcribed to facilitate analysis.

### IN-DEPTH INTERVIEWS

In-depth interviews encourage and motivate visitors to describe their experiences, express their opinions and feelings, and share with the interviewer the meaning they constructed from an experience. In-depth interviews produce data rich in information because interviewees talk about personal experiences.

### SUMMATIVE EVALUATION INTERVIEWS

As part of the summative evaluation, RK&A conducted interviews with three visitor groups—those who only visited the exhibition (Exhibition-only), those who visited the exhibition and then completed an online *CSI: The Experience* Web Adventure (Exhibition & Web), and those who only completed the *CSI: The Experience* Web Adventure (Web-only). Participants were recruited as follows:

- ◆ **Exhibition-only Interviews** – RK&A intercepted visitors 9 years and older as they exited *CSI: The Experience* at SMM. Following a continuous random sampling method, visitors ages 9 and older were eligible to participate and asked to answer several open-ended questions about their experience; interviews were conducted onsite immediately after recruitment. A parent or guardian signed a parental permission form for participants between the ages of 9 and 17.
- ◆ **Exhibition & Web interviews** – RK&A intercepted visitors 9 years and older as they exited the *CSI: The Experience* exhibition at SMM and asked if they would be willing to use a Web Adventure on the *CSI: The Experience* Web site. Willing participants were given an information card with the Web Adventure's URL and were asked to complete the Web Adventure following their visit. RK&A collected participants' contact information and explained that 50 participants—25 adults and 25 children—would be selected to participate in a telephone interview about their exhibition and Web Adventure experiences. A parent or guardian signed a parental permission form for participants between the ages of 9 and 17. After their visit, all participants received a reminder e-mail asking them to use the Web Adventure if they had not already done so. To be eligible for an interview, visitors had to complete the Web Adventure by solving the crime.
- ◆ **Web-only Interviews** – RK&A recruited Web-only participants in two ways: via the *CSI* Web site and at SMM.

- ❖ **Recruited via the Web** – A pop-up window appeared every time a Web site visitor completed the Web Adventure by solving the crime and asked for users to participate in a telephone interview about the Web Adventure. Willing participants were redirected to SurveyMonkey.com to complete a screener determining their eligibility to participate. Only users who had not seen the *CSI: The Experience* exhibition and were 18 years old or older were eligible to participate. Eligible participants submitted their contact information and were informed that only a few participants would be selected to participate in a telephone interview about their Web Adventure experience.
- ❖ **Recruited at SMM** – RK&A intercepted visitors 9 years and older as they exited SMM and asked whether they would be willing to use a Web Adventure on the *CSI: The Experience* Web site and participate in a telephone interview about the Web Adventure. Only visitors who had not seen the *CSI: The Experience* exhibition were eligible to participate. Willing participants were given an information card with the Web Adventure's URL and were asked to visit the Web site to use the Web Adventure following their visit. RK&A collected participants' contact information and explained that only some participants would be selected to participate in a telephone interview about their Web Adventure experience. A parent or guardian signed a parental permission form for participants between the ages of 9 and 17. After their visit, all participants received a reminder e-mail asking them to use the Web Adventure if they had not already done so. To be eligible for an interview, visitors had to complete the Web Adventure by solving the crime.

In designing the interview guides for all three groups, RK&A intentionally asked open-ended questions to allow interviewees the freedom to discuss what they felt was meaningful (see Appendix F for all three interview guides). However, while the interview questions were open-ended, the interview guides were standardized, meaning data collectors were not to stray from the interview guide or probe more than described on the interview guide. Standardization was important as some of the interview data were scored with a rubric and analyzed quantitatively. All interviews were audio-recorded with participants' or caregivers' permission and transcribed to facilitate analysis.

## PROCESS EVALUATION INTERVIEWS

For the process evaluation, in-depth telephone interviews were conducted in phase one (at the beginning of the project) and phase two (at the end of the project). In phase one, RK&A interviewed three partners unable to participate in a facilitated group discussion in Fall 2007. In phase two, RK&A interviewed eight partners in Fall 2008 and Winter 2009 that also participated in phase one of the process evaluation.

FWMSH staff provided RK&A with partners' contact information, and RK&A contacted project partners via e-mail and scheduled telephone interviews. While availability precluded some partners' participation, RK&A interviewed as many partners as could be reached via telephone (please see Appendix D for a list of phase one and two participants). For the process evaluation, interviews were also conducted using open-ended interview guides (see Appendix G); however, these interviews did not necessitate the same standardization as interviews for the summative evaluation.

## LIMITATIONS

### WEB ADVENTURE RECRUITMENT

The study required that interview participants complete the Web Adventure by solving the crime. The average time required to complete the Web Adventure was one to two hours. As a result, many Exhibition & Web and Web-only participants recruited at SMM struggled to complete the Web Adventure and, thus, were ineligible to participate. Further, the study required an equal number of adult

and child participants, and options for recruiting child participants were limited to on-site recruitment at SMM owing to parental permission requirements for minors. Given the limited number of participants who completed the Web Adventure and the resource constraints of the study, RK&A did not reach the quota of Web-only participants needed for quantitative comparison (20 interviews were conducted instead of 50).

#### **TIME BETWEEN VISITORS' EXPERIENCES AND TELEPHONE INTERVIEW**

The most realistic and efficient way to capture the experience of Exhibition & Web and Web-only participants was to collect their contact information at SMM and conduct a telephone interview with them as soon as possible after they completed the Web Adventure. As stated previously, completing the Web Adventure proved challenging for many visitors, and RK&A interviewers called many people before finding someone who had solved the crime. As a result, the time that lapsed between a participant's exhibition and/or Web Adventure experience and his/her telephone interview varied greatly (i.e., one to three weeks).

## **DATA ANALYSIS**

### **TIMING AND TRACKING OBSERVATIONS**

Timing and tracking observation data are quantitative and were analyzed using SPSS 12.0.1 for Windows, a statistical package for personal computers. Analyses included both descriptive and inferential methods. Statistical tests employed a 0.01 level of significance to preclude findings of little practical significance.<sup>7</sup> However, all statistical analyses run are listed in Appendix H.

Frequency distributions were calculated for all variables. Summary statistics were also calculated for time variables. Summary statistics include the range, median (50<sup>th</sup> percentile, the data point at which half the responses fall above and half fall below)<sup>8</sup>, mean (average), and standard deviation (spread of scores: “±” in tables).

To examine the relationship between two categorical variables, cross-tabulation tables were computed to show the joint frequency distribution of the variables, and the chi-square statistic ( $X^2$ ) was used to test the significance of the relationship. For example, “stop at exhibit” was tested against “age group” to determine whether exhibit stops were age-related.

To test for differences in the medians of two or more groups, the nonparametric Kruskal-Wallis (K-W) test was performed.<sup>9</sup> For example, “total time in the exhibition” was compared by “age group” to determine whether time spent in the exhibition was age-related.

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<sup>7</sup> When the level of significance is set to  $p = 0.01$ , any finding that exists at a probability ( $p$ -value)  $\leq 0.01$  is “significant.” When a finding (such as a relationship between two variables) has a  $p$ -value of 0.01, there is a 99 percent probability that the finding exists; that is, in 99 out of 100 cases, the finding is correct. Conversely, there is a 1 percent probability that the finding would not exist; in other words, in 1 out of 100 cases, the finding appears by chance.

<sup>8</sup> Medians rather than means are reported in the timing and tracking section of this document because, as is typical, the number of exhibits used and the time spent by visitors were distributed unevenly across the range. For example, whereas most visitors spent a short to moderate amount of time in the exhibition, a few spent an unusually long time. When the distribution of scores is extremely asymmetrical (i.e., “lopsided”), the mean is affected by the extreme scores and, consequently, falls further away from the distribution's central area. In such cases, the median is a better indicator of the distribution's central area because it is not sensitive to the values of scores above and below it—only to the number of such scores.

<sup>9</sup> The Kruskal-Wallis (K-W) test is a nonparametric statistical method for testing the equality of population medians of two or more groups. Nonparametric statistical methods do not assume that the underlying distribution of a variable is “normal” with a symmetric bell-shape, so they are appropriate for testing variables with asymmetric distributions such as “total time in

## IN-DEPTH INTERVIEWS

In-depth interview and discussion group data are qualitative, meaning that results are descriptive, following from the interviews' and discussion group's conversational nature. Data from in-depth interviews with visitors was *also* analyzed quantitatively through the development of a scoring rubric.

### QUALITATIVE DATA ANALYSIS

In analyzing the data qualitatively, the evaluator studied verbatim transcripts for meaningful patterns, and as patterns emerge, grouped similar responses, eliciting trends in the data.

### RUBRIC SCORING DEVELOPMENT AND PROCESS

While interview data is typically analyzed qualitatively, it can also be analyzed quantitatively through the use of a scoring rubric. In this study, the scoring rubric describes, on a continuum, visitors' understanding of forensic science, capturing the nuances in visitors' experiences in a quantitative manner. By doing so, RK&A can test independent variables, such as gender, against rubric scores to search for statistically significant relationships.

RK&A developed a scoring rubric that includes a continuum of understandings of forensic science on a scale from 1, "below beginning understanding," to 4, "accomplished understanding" (see pages 24-26 for the Interview Scoring Rubric). RK&A used information gathered from the *CSI: The Experience* development team, the exhibition and Web Adventure, and an early analysis of data from the in-depth interviews (the actual language used by visitors to talk about the exhibition and Web Adventure) to develop the rubric.

After developing the rubric, verbatim transcripts were scored on the 4-point scale described above for five visitor outcomes or objectives. Two individuals—one RK&A staff and one data collector—scored a subset of the interviews independently to gauge inter-rater reliability; they agreed 75 percent of the time, a highly acceptable inter-reliability rating. The data collector scored the remaining interviews using the rubric. Please note that to avoid bias, RK&A selected a data collector who had not conducted the interviews. Data, including rubric scores and interviewees' demographic information, were also analyzed using SPSS 12.0.1 for Windows. Analyses included both descriptive and inferential methods.

For the interview rubric rating scale scores, a three-way analysis of variance (ANOVA) compared the mean scores according to three factors: (1) Exhibition-only vs. Exhibition & Web group, (2) age group, and (3) frequency of visits to science museums. For these analyses, the F-statistic was used to test whether the mean scores differed according to any of the three factors, or by some combination of the three factors.

All statistical tests employed a two-tailed 0.05 level of significance to preclude findings of little practical significance.<sup>10</sup> However, all statistical analyses run are listed in Appendix I.

## FACILITATED GROUP DISCUSSION

Data from the facilitated group discussion were analyzed qualitatively. As such, the evaluator studied verbatim transcripts for meaningful patterns, and as patterns emerged, grouped similar responses, eliciting trends in the data.

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the exhibition." The K-W test is analogous to a One-way Analysis of Variance, with the scores replaced by their ranks. The K-W test statistic  $H$  has approximately a chi-square distribution.

<sup>10</sup> When the level of significance is set to  $p = 0.05$ , any finding that exists at a probability ( $p$ -value)  $\leq 0.05$  is "significant." When a finding (such as a relationship between two variables) has a  $p$ -value of 0.05, there is a 95 percent probability that the finding exists; that is, in 95 out of 100 cases, the finding is correct. Conversely, there is a 5 percent probability that the finding would not exist; in other words, in 5 out of 100 cases, the finding appears by chance.

## REPORTING METHOD

### QUANTITATIVE DATA

This report presents quantitative data in tables. Percentages within tables may not always equal 100 owing to rounding. Findings within each topic are presented in descending order, starting with the most frequently occurring.

### QUALITATIVE DATA

Qualitative data are presented in narrative and with verbatim quotations (edited for clarity). For quotations, the interviewer's or facilitator's remarks appear in parentheses and, for visitors' quotes, the speaker's gender and age appear in brackets following the quotation.<sup>11</sup> Trends and themes in the data are also presented from most- to least-frequently occurring.

#### SECTIONS OF THE REPORT:

1. Timing and Tracking Observations
2. Rubric-scored Exhibition-Only and Exhibition & Web Interviews
3. Web-only Interviews
4. Qualitative Analysis of In-depth Interviews
5. Process Evaluation

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<sup>11</sup> For process evaluation findings, quotes are not attributed to partners or their organizations for purposes of confidentiality.

# PRINCIPAL FINDINGS: TIMING AND TRACKING OBSERVATIONS

## INTRODUCTION

Observation data for *CSI: The Experience* were collected at Science Museum of Minnesota (SMM) in St. Paul, Minnesota. A total of 98 observations of visitors 9 years and older were completed between October and November 2008.<sup>12</sup>

Readers should note that at SMM, visitors paid a general admission fee that included admission to *CSI: The Experience*. Timed tickets, however, were needed for the exhibition. Tickets were available at SMM's ticket desk and could be picked up at the time the general admission ticket was purchased.<sup>13</sup>

Observations were conducted during weekdays (71 percent) and weekend days (29 percent) (see Table 1). Most observations were conducted in the afternoon (76 percent), and most visitors experienced a low to moderate level of crowding (87 percent).

**TABLE I**  
**DATA COLLECTION CONDITIONS**

<b>DAY OF THE WEEK (n = 98)</b>	<b>%</b>
Weekday	71.4
Saturday	21.4
Sunday	7.1
<b>TIME OF DAY (n = 98)</b>	<b>%</b>
AM	24.5
PM	75.5
<b>LEVEL OF CROWDING (n = 98)</b>	<b>%</b>
Low	45.9
Moderate	40.8
High	13.3

<sup>12</sup> One-hundred observations were collected, although two were removed from analysis because the observed visitor was visiting with an organized group.

<sup>13</sup> SMM reported that on days when visitation was low, timed tickets were not required.

## VISITOR DESCRIPTIONS

### DEMOGRAPHIC CHARACTERISTICS

Data collectors recorded the gender and age group of each observed visitor. As shown in Table 2, approximately one-half of visitors are female (51 percent). Additionally, the sample is predominantly adults (18 and older) (82 percent). Approximately one-third are middle-aged adults (35 – 54 years) (35 percent), and one-third are younger adults (18 – 34 years) (30 percent).

**TABLE 2**  
**DEMOGRAPHIC CHARACTERISTICS**

<b>GENDER (<i>n</i> = 97)</b>	<b>%</b>
Female	50.5
Male	49.5
<b>AGE GROUP (IN YEARS, <i>n</i> = 98)</b>	<b>%</b>
9 – 11	6.1
12 – 14	8.2
15 – 17	4.1
18 – 24	13.3
25 – 34	16.3
35 – 44	22.4
45 – 54	12.2
55 – 64	12.2
65 or older	5.1

### DESCRIPTION OF THE VISIT GROUP

More than one-half of visitors were visiting with a group of adults (57 percent), while just over one-third were visiting with a group of adults and children (38 percent) (see Table 3). Additionally, almost one-half were visiting in a group of two (48 percent).

**TABLE 3**  
**DESCRIPTION OF VISIT GROUP**

<b>GROUP COMPOSITION<sup>1</sup> (<i>n</i> = 98)</b>	<b>%</b>
Adults and children	37.8
Adults only	57.1
Alone	5.1
<b>GROUP SIZE<sup>2</sup> (<i>n</i> = 98)</b>	<b>%</b>
Alone	5.1
2	48.0
3	19.4
4	7.1
5 or more	20.4

<sup>1</sup> Anyone under 18 years is considered a child.

<sup>2</sup> Group size (including the observed visitor): range = 1 – 8 visitors; median = 2 visitors; mean = 3 visitors, ( $\pm 1.50$ ).

## VISIT CHARACTERISTICS

Data collectors recorded visit characteristics specific to the exhibition, which include whether visitors took a handout, chose the crime which they would investigate<sup>14</sup>, and looked at the miniatures outside the exhibition space<sup>15</sup>. Additionally, data collectors recorded the crime that visitors investigated<sup>16</sup>.

Most visitors took a handout (90 percent) and were assigned a crime to investigate (e.g., they did not choose the crime) (97 percent) (see Table 4). Investigation of crimes was approximately even: 42 percent investigated Blue: Crime #2, 37 percent investigated Green: Crime # 1, and 22 percent investigated Red: Crime # 3. Regarding the miniatures, three-quarters of visitors did not look at them.

**TABLE 4**  
**VISIT CHARACTERISTICS**

<b>DID THE VISITOR TAKE A HANDOUT? (n = 97)</b>	<b>%</b>
Yes	89.7
No	10.3
<b>DID THE VISITOR CHOOSE THE CRIME? (n = 96)</b>	<b>%</b>
No	96.9
Yes	3.1
<b>WHICH CRIME DID THE VISITOR INVESTIGATE? (n = 98)</b>	<b>%</b>
Green: Crime # 1	35.7
Blue: Crime # 2	41.8
Red: Crime # 3	22.4
<b>DID THE VISITOR LOOK AT THE MINIATURES? (n = 89)</b>	<b>%</b>
No	77.5
Yes	22.5

<sup>14</sup> Although rare, RK&A noticed that sometimes visitors selected the crime that they worked on. Thus, this information, recorded as a choice, may have impacted visitors' behaviors in the exhibition.

<sup>15</sup> Miniatures are models of crime scenes used in several episodes of the television show *CSI: Crime Scene Investigation*. The miniatures were displayed outside the designated exhibition space but near the exhibition's entrance. While it was not possible to incorporate the miniatures on the timing and tracking form, FWMSH was interested in documenting whether visitors looked at the miniatures before or after their visit.

<sup>16</sup> The crime investigated was identified by the handout visitors or their group member(s) took.



## OVERALL VISITATION PATTERNS

### TOTAL TIME SPENT IN THE EXHIBITION

Visitors' total time in *CSI: The Experience* was calculated from the moment the visitor entered the Briefing Area to the moment the visitor returned the clipboard. Time spent in the exhibition ranged from 17 minutes to over two hours, with a median time of approximately 41 minutes (see Table 5).

**TABLE 5**  
**TOTAL TIME SPENT IN EXHIBITION**

<b>TOTAL TIME (IN MINUTES, n = 98)</b>	<b>%</b>
Fewer than 30	3.1
30– 40	40.8
40– 50	30.6
50– 60	15.3
More than 60	10.2
<b>SUMMARY STATISTICS (n = 98)</b>	
	<b>TIME HOUR:MIN:SEC</b>
Range	17:37 to 2:02:58
Median time	41:23
Mean time	44:27
Standard deviation ( $\pm$ )	14:12

### TOTAL NUMBER OF EXHIBITS AT WHICH VISITORS STOPPED

Visitors to *CSI: The Experience* could stop at a total of 60 exhibits. About one-half of exhibits were exhibits related to investigating the crime, which RK&A identified as “crime exhibits” (31 exhibits). Crime exhibits include exhibits specific to a particular crime scene (27 exhibits), with nine exhibits specific to each of the three crime scenes (Green: Crime Scene # 1, Blue: Crime Scene # 2, and Red: Crime Scene # 3) (see Table 6). Crime exhibits also included two exhibits that all visitors had to experience to solve the crime (Briefing Area and Report to Grissom), and two exhibits where visitors could leave or listen to comments regarding the crime they were investigating and look at layouts of the crime scenes (Lab 1: Layout Table and Lab 2: Layout Table). The remaining one-half of exhibits were not required for investigating a crime, but contained supplemental information about forensic science. RK&A refers to these exhibits as “supplemental exhibits” (29 exhibits).

**TABLE 6**  
**EXHIBITS BY CATEGORY**

<b>EXHIBIT CATEGORIES</b>	<b>n</b>
Supplemental exhibits	31
Crime exhibits	29
Total	60

Of the nine exhibits specific to a crime scene, eight were essential for visitors to collect crime scene evidence and complete the handout; the one excluded exhibit—the Evidence Photo Station—reviewed essential evidence from the crime scene. Thus, to complete an investigation and the handout, visitors should have visited a minimum of 10 exhibits (eight exhibits specific to crime scenes + Briefing Area + Report to Grissom).

As shown in Table 7, the total number of exhibits at which visitors stopped ranged from seven to 34 exhibits. Almost one-half of visitors stopped at between 10 and 14 exhibits; thus, they met or exceeded the requirement for completing the handout (49 percent).

**TABLE 7**  
**TOTAL NUMBER OF EXHIBITS STOPPED AT IN EXHIBITION**

<b>TOTAL NUMBER OF EXHIBITS (n = 98)</b>	<b>%</b>
Fewer than 9	4.1
10 – 14	49.0
15 – 19	36.7
20 or more	10.2
<b>SUMMARY STATISTICS (n = 98)</b>	<b>NUMBER OF EXHIBITS</b>
Range	7 to 34
Median number	14
Mean number	15
Standard deviation (±)	4

### **SWEEP RATE INDEX AND PERCENTAGE DILIGENT VISITOR INDEX**

Typically, RK&A would compare *CSI: The Experience* to other exhibits using Beverly Serrell’s “Sweep Rate Index” and “Percentage Diligent Visitor Index.”<sup>17</sup> However, because *CSI: The Experience* is unique in that all visitors are not expected to visit all exhibits, it is not reasonable to compare *CSI: The Experience* with other exhibitions using Serrell’s indexes.

<sup>17</sup> Serrell, B. (1998). *Paying attention: Visitors and museum exhibitions*. Washington, D.C.: American Association of Museums.

## VISITATION TO INDIVIDUAL EXHIBITS

In this section, findings are reported by crime exhibits and supplemental exhibits. See page 10 for a description of crime exhibits and supplemental exhibits.

### CRIME EXHIBITS

See Table 8 (next page) for the amount of time visitors spent at each crime exhibit. Visitors spent the most time at the three Crime Scenes, Briefing Area, and Report to Grissom (more than four minutes). Visitors also spent a large amount of time at Green: What type of blood splatter did you see in the living room?, Blue: How good are you at decoding text messages?, Green: Autopsy Room #1, and Green: Can DNA help solve this puzzling case? (three – four minutes each).

Visitors spent the least time at Red: Who is the victim? and the three Evidence Photo Stations (less than one minute). Visitors also spent a short time at the two Layout Tables, Red: What caliber is the bullet found inside the victim's skull?, and Blue: Which car ran over Penny? (less than one minute, 30 seconds).

**TABLE 8****TIME SPENT AT INDIVIDUAL CRIME EXHIBITS**

<b>EXHIBIT NAME</b>	<b>NUMBER OF VISITORS WHO STOPPED (n = 98)</b>	<b>MEDIAN TIME (MIN:SEC)</b>
Green: Crime Scene # 1: A House Collided	35	4:58
Blue: Crime Scene #2: Who Got Served?	41	4:48
Red: Crime Scene #3: No Bones About It	22	4:47
Briefing Area	96	4:38
Report to Grissom	94	4:04
Green: What type of blood splatter did you see in the living room?	33	3:48
Blue: How good are you at decoding text messages?	41	3:29
Green: Autopsy Room #1	36	3:12
Green: Can DNA help solve this puzzling case?	34	3:02
Blue: When did Penny die?	41	2:58
Blue: Who ripped Penny's photograph?	41	2:54
Green: Whose fingerprints were found in blood and on the beer bottles?	33	2:52
Red: Is the gun found near the crime scene the murder weapon?	22	2:50
Blue: Autopsy Room #2	41	2:41
Red: Which dog's hair was found at the crime scene?	24	2:38
Red: Autopsy Room #3	22	2:21
Red: Can seeds and pollen tell you where the murder actually happened?	23	2:16
Green: What kind of shoe left the print in the living room?	32	2:08
Blue: What is Penny's real identity?	49	2:03
Blue: What is the white powder found at the scene?	40	2:01
Green: Was the victim drinking beer before his death?	34	1:47
Red: What kind of hair was found at the scene?	22	1:34
Green: Do the fibers in the victim's head wound match any "known" fibers?	34	1:33
Blue: Which car ran over Penny?	41	1:24
Red: What caliber is the bullet found inside the victim's skull?	22	1:23
Lab 1: Layout Table	77	1:22
Lab 2: Layout Table	43	1:15
Green: Evidence Photo Station	27	:56
Blue: Evidence Photo Station	38	:49
Red: Evidence Photo Station	20	:43
Red: Who is the victim?	14	:31

See Table 9 for the percentage of visitors who stopped at crime exhibits. Most visitors stopped at the Briefing Area (98 percent) and Report to Grissom (96 percent). A large percentage also stopped at Lab 1: Layout Table (79 percent), Blue: What is Penny’s real identity? (50 percent), and Lab 2: Layout Table (44 percent).

As expected, most visitors stopped at exhibits related to Blue: Crime Scene #2, which 41 visitors investigated, and the least amount of visitors stopped at exhibits related to Red: Crime Scene #3, which 22 visitors investigated.

**TABLE 9**  
**PERCENTAGE OF VISITORS WHO STOPPED AT CRIME EXHIBITS**

<b>EXHIBIT NAME</b>	<b>NUMBER OF VISITORS WHO STOPPED (n = 98)</b>	<b>% OF VISITORS WHO STOPPED</b>
Briefing Area	96	98.0
Report to Grissom	94	95.9
Lab 1: Layout Table	77	78.6
Blue: What is Penny’s real identity?	49	50.0
Lab 2: Layout Table	43	43.9
Blue: Crime Scene #2: Who Got Served?	41	41.8
Blue: Which car ran over Penny?	41	41.8
Blue: Who ripped Penny’s photograph?	41	41.8
Blue: How good are you at decoding text messages?	41	41.8
Blue: When did Penny die?	41	41.8
Blue: Autopsy Room #2	41	41.8
Blue: What is the white powder found at the scene?	40	40.8
Blue: Evidence Photo Station	38	38.8
Green: Autopsy Room #1	36	36.7
Green: Crime Scene # 1: A House Collided	35	35.7
Green: Do the fibers in the victim’s head wound match any “known” fibers?	34	34.7
Green: Was the victim drinking beer before his death?	34	34.7
Green: Can DNA help solve this puzzling case?	34	34.7
Green: What type of blood splatter did you see in the living room?	33	33.7
Green: Whose fingerprints were found in blood and on the beer bottles?	33	33.7
Green: What kind of shoe left the print in the living room?	32	32.7
Green: Evidence Photo Station	27	27.6
Red: Which dog’s hair was found at the crime scene?	24	24.5
Red: Can seeds and pollen tell you where the murder actually happened?	23	23.5
Red: Crime Scene #3: No Bones About It	22	22.4
Red: What kind of hair was found at the scene?	22	22.4
Red: What caliber is the bullet found inside the victim’s skull?	22	22.4
Red: Is the gun found near the crime scene the murder weapon?	22	22.4
Red: Autopsy Room #3	22	22.4
Red: Evidence Photo Station	20	20.4
Red: Who is the victim?	14	14.3

At four crime exhibits, the number of visitors who stopped at the exhibit exceeded the number of visitors investigating the crime. These crime exhibits were Blue: What is Penny’s real identity?, Green: Autopsy Room #1, Red: Which dog’s hair was found at the crime scene?, and Red: Can seeds and pollen tell you where the murder actually happened? (see Table 10).

**TABLE 10**  
**CRIME EXHIBITS AT WHICH THE NUMBER OF VISITORS WHO STOPPED EXCEEDED THE NUMBER OF VISITORS INVESTIGATING THE CRIME**

<b>EXHIBIT NAME</b>	<b>NUMBER OF VISITORS WHO INVESTIGATED THE CRIME (n = 98)</b>	<b>NUMBER OF VISITORS WHO STOPPED</b>
Blue: What is Penny’s real identity?	41	49
Green: Autopsy Room #1	35	36
Red: Which dog’s hair was found at the crime scene?	22	24
Red: Can seeds and pollen tell you where the murder actually happened?	22	23

**SUPPLEMENTAL EXHIBITS**

Visitors spent less than one minute at every supplemental exhibit (see Table 11). Visitors spent the most time at Millions Served & Give it a Whorl! (51 seconds) and Skeleton Keys (50 seconds). Visitors spent the least time at Tell the Truth, the Whole Truth and Nothing but the Truth (9 seconds) and Leaving a Good Impression (7 seconds).

**TABLE 11  
TIME SPENT AT SUPPLEMENTAL EXHIBITS**

<b>EXHIBIT NAME</b>	<b>NUMBER OF VISITORS WHO STOPPED (n = 98)</b>	<b>MEDIAN TIME (MIN:SEC)</b>
Millions Served & Give it a Whorl!	4	:51
Skeleton Keys	11	:50
Here Today, Bone Tomorrow	9	:48
Dental Record Matching	22	:48
In the Groove	10	:44
Insects Can Play a “Bug” Part in Determining Time of Death	13	:42
Shooting Holes in a Story & Lock Stock and Two Smoking Barrels	13	:40
What Type Are You?	2	:40
Anatomy of a Gun & Match Game	3	:35
Tricks of the Trade: Super Glue Makes a Case that Sticks!	6	:35
Animals Help Sniff Out Crime	3	:33
DNA Solves Mystery of Identity	5	:32
Do You Glow in the Dark?	29	:31
What Do a Cigarette Butt and Eyeglasses Have in Common?	17	:31
A Picture is Worth a Thousand Words & Recreating the Lost Faces of the Dead	21	:27
Skeletons in the Closet	8	:26
Every Contact Leaves a Trace – Locard’s Exchange Principle	16	:24
We are Living in a Digital World	16	:22
Grissom’s Office	34	:20
Tools of the Trade	2	:20
The Dose Makes the Poison & A Lethal Dose	8	:18
Who Are You?	11	:18
Tricks of the Trade & At the Scene of the Crime: the Chain of Custody Begins. . .	6	:16
Bug’s Life	7	:15
Drinking and Driving Do Not Mix & Spies, Lies and Poison	10	:15
Lions and Fibers and Hairs...Oh My!	1	:13
Ridges of Identity	4	:12
Tell the Truth, the Whole Truth and Nothing but the Truth	8	:09
Leaving a Good Impression	1	:07

See Table 12 for the percentage of visitors who stopped at supplemental exhibits. One-third of visitors stopped at Grissom’s Office (35 percent)—making it the most popular supplemental exhibit. Visitors also frequently stopped at Do You Glow in the Dark? (29 percent), Dental Record Matching (22 percent), and A Picture is Worth a Thousand Words & Recreating the Lost Faces of the Dead (21 percent).

**TABLE 12**  
**PERCENTAGE OF VISITORS WHO STOPPED AT SUPPLEMENTAL EXHIBITS**

<b>EXHIBIT NAME</b>	<b>NUMBER OF VISITORS WHO STOPPED (n = 98)</b>	<b>% OF VISITORS WHO STOPPED</b>
Grissom’s Office	34	34.7
Do You Glow in the Dark?	29	29.6
Dental Record Matching	22	22.4
A Picture is Worth a Thousand Words & Recreating the Lost Faces of the Dead	21	21.4
What Do a Cigarette Butt and Eyeglasses Have in Common?	17	17.3
Every Contact Leaves a Trace – Locard’s Exchange Principle	16	16.3
We are Living in a Digital World	16	16.3
Shooting Holes in a Story & Lock Stock and Two Smoking Barrels	13	13.3
Insects Can Play a “Bug” Part in Determining Time of Death	13	13.3
Skeleton Keys	11	11.2
Who Are You?	11	11.2
In the Groove	10	10.2
Drinking and Driving Do Not Mix & Spies, Lies and Poison	10	10.2
Here Today, Bone Tomorrow	9	9.2
Tell the Truth, the Whole Truth and Nothing but the Truth	8	8.2
Skeletons in the Closet	8	8.2
The Dose Makes the Poison & A Lethal Dose	8	8.2
Bug’s Life	7	7.1
Tricks of the Trade & At the Scene of the Crime: the Chain of Custody Begins. . .	6	6.1
Tricks of the Trade: Super Glue Makes a Case that Sticks!	6	6.1
DNA Solves Mystery of Identity	5	5.1
Millions Served & Give it a Whorl!	4	4.1
Ridges of Identity	4	4.1
Anatomy of a Gun & Match Game	3	3.1
Animals Help Sniff Out Crime	3	3.1
Tools of the Trade	2	2.0
What Type Are You?	2	2.0
Lions and Fibers and Hairs...Oh My!	1	1.0
Leaving a Good Impression	1	1.0



## CHARACTERISTICS ASSOCIATED WITH TIME SPENT AT INDIVIDUAL EXHIBITS

Time spent at individual exhibits visited by 20 or more visitors was tested against visitor and visit characteristics. Several significant findings emerged.

Time spent at one exhibit differed by gender:

- ◆ Females were more likely to spend more time at RED: What caliber is the bullet found inside the victim's skull? than males (see Table 13).

**TABLE 13**  
**TIME AT INDIVIDUAL EXHIBITS BY GENDER**

EXHIBIT	n	GENDER	
		MALE	FEMALE
		MEDIAN TIME (MIN:SEC)	MEDIAN TIME (MIN:SEC)
Red: What caliber is the bullet found inside the victim's skull? <sup>1</sup>	22	:42	1:45

<sup>1</sup> $\chi^2 = 6.962$ ;  $df = 1$ ;  $p = .008$

Time spent at two exhibits differed by age group:

- ◆ Children (9-17 years) and older adult visitors (55 + years) were more likely to spend more time at GREEN: Was the victim drinking beer before his death? than young adult visitors (18-34 years) (see Table 14).
- ◆ Middle-aged visitors (35-54 years) were more likely to spend more time at BLUE: When did Penny die? than children (9-17 years) (see Table 14).

**TABLE 14**  
**TIME AT INDIVIDUAL EXHIBITS BY AGE GROUP**

EXHIBIT	n	AGE GROUP (IN YEARS)			
		9 - 17	18 - 34	35 - 54	55 +
		MEDIAN TIME (MIN:SEC)	MEDIAN TIME (MIN:SEC)	MEDIAN TIME (MIN:SEC)	MEDIAN TIME (MIN:SEC)
Green: Was the victim drinking beer before his death? <sup>1</sup>	34	2:42	:53	1:48	2:03
Blue: When did Penny die? <sup>2</sup>	41	1:42	3:06	4:05	3:46

<sup>1</sup> $\chi^2 = 14.285$ ;  $df = 3$ ;  $p = .003$

<sup>2</sup> $\chi^2 = 10.970$ ;  $df = 3$ ;  $p = .012$

## CHARACTERISTICS ASSOCIATED WITH STOPS AT INDIVIDUAL EXHIBITS

Whether a visitor stopped at individual exhibits was compared according to gender, age, and whether the visitor was visiting with a child. There was one significant finding:

- ◆ Older visitors (55 + years) were most likely to stop at Lab 2: Layout Table (see Table 15).

**TABLE 15**  
**STOP AT LAB 2: LAYOUT TABLE BY AGE**

	AGE GROUP (IN YEARS)				TOTAL
	9-17	18-34	35-54	55 +	
<b>STOP AT LAB 2: LAYOUT TABLE (n = 98)</b>	%	%	%	%	%
Yes <sup>1</sup>	38.9	24.1	47.1	76.5	43.9
No	61.1	75.9	52.9	23.5	56.1

<sup>1</sup> $\chi^2 = 12.244$ ;  $df = 3$ ;  $p = .007$

## VISITOR BEHAVIORS

This section describes how visitors experienced exhibits in the exhibition, focusing on visitors' interactions at exhibits as well as visitors' misuse of exhibit components. See Appendix J for a complete list of visitor behaviors.

### INTERACTIONS WITH OTHERS

Data collectors noted whether the observed visitor interacted with anyone while using an exhibit. Overall, most visitors interacted with others (96 percent), and almost two-thirds of visitors interacted with others at 10 or more exhibits (64 percent) (see Table 16).

**TABLE 16**  
**NUMBER OF EXHIBITS AT WHICH VISITORS INTERACTED WITH OTHERS**

NUMBER OF EXHIBITS AT WHICH VISITORS INTERACTED WITH OTHERS (n = 98)	% OF VISITORS WHO INTERACTED WITH OTHERS (n = 98)
0	4.1
1 – 4	6.1
5 – 9	25.5
10 – 14	55.1
15 or more	9.2
<b>SUMMARY STATISTICS (n = 98)</b>	<b>NUMBER OF INTERACTIONS</b>
Range	0 to 22
Median number	11
Mean number	10
Standard deviation ( $\pm$ )	4

Data collectors also noted whether the observed visitor interacted with members of their group or with strangers. Of those visitors who interacted in the exhibition, 98 percent did so with members of their group and 14 percent with strangers (see Table 17).

**TABLE 17**

**TYPE OF INTERACTION**

<b>TYPE OF INTERACTION</b>	<b>% OF VISITORS WHO INTERACTED WITH OTHERS (n = 94)</b>
Interaction with group	97.9
Interaction with strangers	13.8

<sup>1</sup>Totals do not equal 100 because visitors could interact with members of their group *and* with strangers.

# PRINCIPAL FINDINGS: RUBRIC SCORED EXHIBITION-ONLY AND EXHIBITION & WEB INTERVIEWS

## INTRODUCTION

RK&A conducted a total of 119 interviews, 99 of which were scored using a rubric (see pages 24-26).<sup>18</sup> Of these, 50 visitors were interviewed after visiting the *CSI: The Experience* exhibition (Exhibition-only), and 49 visitors were interviewed after visiting the exhibition and solving the Web Adventure on the *CSI: The Experience* Web site (Exhibition & Web) (see Table 18). In each interview group, approximately one-half of participants are children (visitors 9 to 17 years), and one-half are adults (18 years and older).

**TABLE 18**

**INTERVIEW GROUP**

<b>INTERVIEW GROUP</b>	<b>NUMBER OF ADULTS</b>	<b>NUMBER OF CHILDREN</b>	<b>TOTAL NUMBER OF PARTICIPANTS</b>
Exhibition-only	25	25	50
Exhibition & Web	24	25	49

<sup>18</sup> RK&A only ran statistics on rubric data for Exhibition-only and Exhibition & Web participants ( $n = 99$ ). The sample size of Web-only participants ( $n = 20$ ) was too small to allow for quantitative comparison with the other two interview groups. Please refer to the “Limitations” section of the methodology for an explanation of why an adequate sample was not collected.

## DEMOGRAPHIC AND VISIT CHARACTERISTICS

Slightly more participants are female than male (53 percent and 47 percent, respectively) (see Table 19). Participants ranged widely in age, from 9 to 68 years. One-quarter are elementary age (8 – 11 years) (24 percent), one-quarter are youths (12 – 17 years) (26 percent), one-quarter are young adults (18 – 34 years) (25 percent), and one-quarter are middle-aged to older adults (35 years and above) (24 percent). Nearly all participants are Caucasian/white (97 percent). Most participants had visited science museums at least two times in the last 12 months (72 percent).

**TABLE 19**  
**DEMOGRAPHIC AND VISIT CHARACTERISTICS OF PARTICIPANTS**

CHARACTERISTIC	INTERVIEW GROUP		TOTAL
	EXHIBITION-ONLY	EXHIBITION & WEB	
<b>GENDER (n = 99)</b>	%	%	%
Male	44	49	47
Female	56	51	53
<b>AGE GROUP (IN YEARS, n = 99)</b>	%	%	%
8 – 11	26	22	24
12 – 14	20	16	18
15 – 17	4	12	8
18 – 34	24	27	25
35 – 54	18	20	19
55+	8	2	5
<b>ETHNICITY (n = 96)</b>	%	%	%
Caucasian/White	100	94	97
African-American/Black	0	2	1
Asian	0	2	1
Hispanic	0	2	1
<b>SCIENCE MUSEUM VISITATION (n = 97)</b>	%	%	%
0-1 time(s)	27	29	28
2-3 times	49	40	44
4 or more times	25	31	28
<b>SUMMARY STATISTICS FOR AGE (n = 99)</b>	<b>AGE IN YEARS</b>	<b>AGE IN YEARS</b>	<b>AGE IN YEARS</b>
Range	9 - 68	8 - 60	8 – 68
Median age	17.5	16.0	16.0
Mean age	24.1	23.0	23.6
± Standard Deviation	± 16.8	± 13.8	± 15.3

## ACHIEVEMENT OF *CSI: THE EXPERIENCE* OBJECTIVES

This section explores participants' achievement of five *CSI: The Experience* objectives, using rubric scores. RK&A reviewed data from each participant's interview and rated (or scored) the participant's achievement of the *CSI: The Experience* objectives according to specific criteria (see pages 24-26 for the Interview Scoring Rubric and page 5 for a description of the interview scoring procedure). Based on the criteria for each objective, RK&A classified participants' achievements of each objective on a four-point scale: 1 = below beginning, 2 = beginning, 3 = developing, and 4 = accomplished. (See Appendix K for Verbatim Examples of Indicators for below beginning, beginning, developing, and accomplished responses for each objective).

RK&A also tested participants' achievement of objectives (rubric score) against participants' gender, age (adult or child), ethnicity, interview group (Exhibition-only or Exhibition & Web), and science museum visitation in the last year (0-1 times, 2-3 times, or 4 or more times). Gender and ethnicity had no significant association with participants' achievement of any objective so these variables were eliminated from further analysis. A three-way analysis of variance (ANOVA) compared the mean rubric scores according to the remaining three factors—interview group, age, and science museum visitation—to determine whether the mean scores differed according to any of the three factors, or by some combination of the three factors.

**INTERVIEW SCORING RUBRIC REMOVED FOR PROPRIETARY PURPOSES**

**INTERVIEW SCORING RUBRIC REMOVED FOR PROPRIETARY PURPOSES**



**INTERVIEW SCORING RUBRIC REMOVED FOR PROPRIETARY PURPOSES**

**SUMMARY OF PARTICIPANTS' ACHIEVEMENT OF *CSI: THE EXPERIENCE* OBJECTIVES BY INTERVIEW GROUP**

See Table 20 for a summary of the rating scores for each objective by interview group, according to the four-point scale: 1 = below beginning; 2 = beginning; 3 = developing; 4 = accomplished. The objectives are listed in order from highest to lowest mean score of the *Exhibition-only* interview group.

Participants in both interview groups scored, on average, between 2 (beginning) and 3 (developing) for all five objectives. The mean scores of the two interview groups are statistically similar for all objectives except Objective 3. For this objective—visitors will understand the scientific principals underlying the different areas of forensic science—Exhibition-only participants had significantly higher mean scores than did Exhibition & Web participants (mean = 2.63 vs. mean = 2.02).

**TABLE 20**  
**SUMMARY OF PARTICIPANTS' ACHIEVEMENT OF OBJECTIVES BY INTERVIEW GROUP**

4-POINT RATING SCALE: 1=BELOW BEGINNING; 2 = BEGINNING; 3 = DEVELOPING; 4 = ACCOMPLISHED	INTERVIEW GROUP	
	EXHIBITION-ONLY	EXHIBITION & WEB
	MEAN	MEAN
4 - Visitors will understand the role technology played in their ability to solve the crime and recognize that technology plays a significant role in forensic science investigations	2.82	2.89
3 - Visitors will understand the scientific principles underlying the different areas of forensic science <sup>1</sup>	2.63	2.02
5 - Visitors will understand the role human judgment plays in conjunction with advances in technology	2.61	2.40
1 - Visitors will use and recognize the process of scientific inquiry	2.57	2.58
2 - Visitors will understand that forensic science is the application of the scientific process to solve crimes	2.27	2.19

<sup>1</sup>F = 8.528; df = 1; p = .005

**OBJECTIVE 1: VISITORS WILL USE AND RECOGNIZE THE PROCESS OF SCIENTIFIC INQUIRY**

When rubric scores for Objective 1 were tested by age, interview group, and science museum visitation, no factors were found to be significant. On the four-point scale, participants had similar mean scores for all three factors (see Table 21).

**TABLE 21**  
**ACHIEVEMENT OF OBJECTIVE 1 BY AGE, INTERVIEW GROUP, AND**  
**SCIENCE MUSEUM VISITATION**

<b>AGE</b>	<b>MEAN</b>
Adult	2.63
Child	2.52
<b>INTERVIEW GROUP</b>	<b>MEAN</b>
Exhibition-only	2.57
Exhibition & Web	2.58
<b>SCIENCE MUSEUM VISITATION IN THE LAST YEAR</b>	<b>MEAN</b>
0-1 time(s)	2.37
2-3 times	2.60
4 or more times	2.74

**OBJECTIVE 2: VISITORS WILL UNDERSTAND THAT FORENSIC SCIENCE IS THE APPLICATION OF THE SCIENTIFIC PROCESS TO SOLVE CRIMES**

When rubric scores for Objective 2 were tested by age, interview group, and science museum visitation, two factors were found to be significant—age and science museum visitation (see Table 22).

- ◆ On the four-point scale, regardless of interview group or science museum visitation, adult participants had a significantly higher mean score than did child participants (adult mean = 2.48 vs. child mean = 1.98).
- ◆ On the four-point scale, regardless of age or interview group, participants who were more-frequent science museum visitors had a significantly higher mean score than did participants who were less-frequent science museum visitors (4+ visits mean = 2.50 vs. 2 - 3 visits mean = 2.19 vs. 0 - 1 visits mean = 2.04).

**TABLE 22**  
**ACHIEVEMENT OF OBJECTIVE 2 BY AGE, INTERVIEW GROUP, AND**  
**SCIENCE MUSEUM VISITATION**

<b>AGE<sup>1</sup></b>	<b>MEAN</b>
Adult	2.48
Child	1.98
<b>INTERVIEW GROUP</b>	<b>MEAN</b>
Exhibition-only	2.27
Exhibition & Web	2.19
<b>SCIENCE MUSEUM VISITATION IN THE LAST YEAR<sup>2</sup></b>	<b>MEAN</b>
0-1 time(s)	2.04
2-3 times	2.19
4 or more times	2.50

<sup>1</sup>F = 12.167; *df* = 1; *p* = .001

<sup>2</sup>F = 3.636; *df* = 2; *p* = .031

**OBJECTIVE 3: VISITORS WILL UNDERSTAND THE SCIENTIFIC PRINCIPALS UNDERLYING THE DIFFERENT AREAS OF FORENSIC SCIENCE**

When rubric scores for Objective 3 were tested by age, interview group, and science museum visitation, two factors were found to be significant—age and interview group (see Table 23).

- ◆ On the four-point scale, regardless of interview group or science museum visitation, adult participants had a significantly higher mean score than did child participants (adult mean = 2.65 vs. child mean = 2.02).
- ◆ On the four-point scale, regardless of age or science museum visitation, Exhibition-only participants had significantly higher mean score than did Exhibition & Web participants (Exhibition-only mean = 2.63 vs. Exhibition & Web mean = 2.02).

**TABLE 23**  
**ACHIEVEMENT OF OBJECTIVE 3 BY AGE, INTERVIEW GROUP, AND**  
**SCIENCE MUSEUM VISITATION**

<b>AGE<sup>1</sup></b>	<b>MEAN</b>
Adult	2.65
Child	2.02
<b>INTERVIEW GROUP<sup>2</sup></b>	<b>MEAN</b>
Exhibition-only	2.63
Exhibition & Web	2.02
<b>SCIENCE MUSEUM VISITATION IN THE LAST YEAR</b>	<b>MEAN</b>
0-1 time(s)	2.44
2-3 times	2.31
4 or more times	2.27

<sup>1</sup>F = 7.973; *df* = 1; *p* = .006

<sup>2</sup>F = 8.528; *df* = 1; *p* = .005

**OBJECTIVE 4: VISITORS WILL UNDERSTAND THE ROLE TECHNOLOGY PLAYED IN THEIR ABILITY TO SOLVE THE CRIME AND RECOGNIZE THAT TECHNOLOGY PLAYS A SIGNIFICANT ROLE IN FORENSIC SCIENCE INVESTIGATIONS**

When rubric scores for Objective 4 were tested by age, interview group, and science museum visitation, age was found to be a significant factor (see Table 24):

- ◆ On the four-point scale, regardless of interview group or science museum visitation, adult participants had a significantly higher mean score than did child participants (mean = 3.08 vs. mean = 2.63).

**TABLE 24**  
**ACHIEVEMENT OF OBJECTIVE 4 BY AGE, INTERVIEW GROUP, AND SCIENCE MUSEUM VISITATION**

<b>AGE<sup>1</sup></b>	<b>MEAN</b>
Adult	3.08
Child	2.63
<b>INTERVIEW GROUP</b>	<b>MEAN</b>
Exhibition-only	2.82
Exhibition & Web	2.89
<b>SCIENCE MUSEUM VISITATION IN THE LAST YEAR</b>	<b>MEAN</b>
0-1 time(s)	2.78
2-3 times	2.93
4 or more times	2.81

<sup>1</sup>F = 7.453; df = 1; p = .003

**OBJECTIVE 5: VISITORS WILL UNDERSTAND THE ROLE HUMAN JUDGMENT PLAYS IN CONJUNCTION WITH ADVANCES IN TECHNOLOGY**

When rubric scores for Objective 5 were tested by age, interview group, and science museum visitation, age was found to be significant (see Table 25):

- ♦ On the four-point scale, regardless of interview group or science museum visitation, adult participants had a significantly higher mean score than did child participants (mean = 2.83 vs. mean = 2.19).

**TABLE 25**  
**ACHIEVEMENT OF OBJECTIVE 5 BY AGE, INTERVIEW GROUP, AND**  
**SCIENCE MUSEUM VISITATION**

<b>AGE<sup>1</sup></b>	<b>MEAN</b>
Adult	2.83
Child	2.19
<b>INTERVIEW GROUP</b>	<b>MEAN</b>
Exhibition-only	2.61
Exhibition & Web	2.40
<b>SCIENCE MUSEUM VISITATION IN THE LAST YEAR</b>	<b>MEAN</b>
0-1 time(s)	2.85
2-3 times	2.28
4 or more times	2.54

<sup>1</sup>F = 9.119; *df* = 1; *p* = .003

# PRINCIPAL FINDINGS: WEB-ONLY INTERVIEWS

## INTRODUCTION

Of 119 interviews, RK&A conducted 20 with participants who used the *CSI: The Experience* Web Adventure. The sample of Web-only participants was too small to allow for quantitative comparison with the Exhibition-only and Exhibition & Web interview groups (please see “Limitations” in the report methodology for further details). Instead, Web-only interview findings are presented qualitatively within the framework of the rubric (see pages 24-26)—that is, findings show the level of forensic science knowledge (below beginning, beginning, developing, and accomplished) interviewees achieved for all five rubric objectives.

The Web-only interview group was comprised primarily of adults ( $n = 18$ ); interviewees’ ages ranged from 10 to 63 with a median of 31. About two-thirds are female (65 percent), about two-thirds are Caucasian/white (79 percent) and most (90 percent) have been to a science museum three times or fewer in the last year.

## ACHIEVEMENT OF *CSI: THE EXPERIENCE* OBJECTIVES

### OBJECTIVE 1: VISITORS USE AND RECOGNIZE THE PROCESS OF SCIENTIFIC INQUIRY

Approximately one-half of interviewees achieved a developing level in their use and recognition of the scientific inquiry process—that is, interviewees partially described the process taken to solve the crime as a scientific, investigative series of steps leading to a solution and could provide at least one example from the Web Adventure (see the first quotation below). One-third achieved a beginning level—that is, interviewees mostly provided a literal account of their Web Adventure experience (e.g., reading, using an interactive, etc.) (see the second quotation). These interviewees described at least one of the steps used to solve the crime (e.g., examined DNA), but did not describe the experience as a scientific, investigative series of steps. The remaining few achieved an accomplished level—that is, interviewees described their overall Web Adventure experience as a scientific, investigative series of steps leading to a solution and provided rich, concrete examples from the Web Adventure (see the third quotation).

First, I went to the crime scene and looked around. I was just looking for anything that looked like it was not supposed to be there. I tried to collect as much evidence as I could, and I mostly just followed what I saw on the TV show, what they do. . . . I remember comparing the fingerprints to the ones they gave us and also the ones that I collected. I also remember comparing shoe treads on the computer. . . . There was a doctor and [another] lady in the morgue that filled in the skull. So I thought that was kind of neat actually, rebuilding the skull. . . . [Finally,] I reported the information collected. [male, 28]

I would just move my mouse over [things] because it [the Web Adventure] did not really give you instructions about where to go or what to click so every time I moved over to a particular character, it would show the hand and I would click on it. So, that is pretty much how I maneuvered myself through and finally, I got the gist of it. I would go to the different locations, and I would click on the different evidence. It really took me quite a while to get it and to do the whole thing. [female, 34]

I remember that you would go and collect the evidence and go to the next crime scene or go



back to the lab and analyze your evidence. . . .I think it was in the lab where you analyze the fingerprints. There were also tire tracks and a knife blade that you had to compare once you found the evidence and found another knife blade. I put the blood in the DNA machine; you could extract DNA and try to match it up to your victim and figure out who you thought she was. . . . At the end, you match up the clues with who you think did it, with the weapon and everything. [female, 31]

## **OBJECTIVE 2: VISITORS UNDERSTAND THAT FORENSIC SCIENCE IS THE APPLICATION OF THE SCIENTIFIC PROCESS TO SOLVE CRIMES**

Slightly more than one-third of interviewees achieved a beginning level in their understanding of forensic science as the application of the scientific process to solve crimes—that is, interviewees defined forensic science in a narrow, specific way (e.g., studying DNA to come to a conclusion) or provided a partial definition (see the first quotation below). About one-third achieved a developing level—that is, when prompted, interviewees accurately defined forensic science (see the second quotation). One-quarter achieved an accomplished level—that is, interviewees defined used the term forensic science unprompted and defined it accurately and completely (see the third quotation).

Forensic science would be the study of clues and information to help you solve a crime.  
[female, 50]

(Based on what you experienced on the Web site, how would you define the term forensic science?) It is about the science you use to solve crimes. [male, 10]

[The Web Adventure] generally educates the public about forensic tools and how investigators process evidence in the lab, how they make sure that they get the proper evidence. . . . Forensic Science is anything and everything they use to solve a crime, evidence that can be processed scientifically. [female, 21]

## **OBJECTIVE 3: VISITORS UNDERSTAND THE SCIENTIFIC PRINCIPALS UNDERLYING THE DIFFERENT AREAS OF FORENSIC SCIENCE**

One-half of interviewees achieved a beginning level in their understanding of scientific principles underlying the different areas of forensic science—that is, interviewees identified at least one basic science (e.g., biology) but did not provide an example of its application from the Web Adventure or provided a general application of science used, but did not identify a specific kind of science (see the first quotation below). One-quarter achieved a developing level—that is, interviewees identified at least one area of forensic or basic science and provided at least one basic example of its application (see the second quotation). Several achieved a below beginning level—that is, interviewees could not identify what types of science they used during their Web Adventure experience. One interviewee achieved an accomplished level—that is, he identified at least one area of forensic or basic science and provided at least one specific, concrete example of its application (see the third quotation).

[The Web Adventure] had a little bit of everything. We were finding things through the microscope and looking at the cells and fabric and fibers. It was just different kinds of science.  
[female, 30]

I used anatomy in the morgue, biology with the DNA, and then there was making the molds of the knives and so that is some kind of materials engineering and then the computer engineering or information technology to analyze evidence in the computer. [female, 41]

We used chemistry when we did some chemical tests to see what was inside the victim's body and had to do the DNA testing to find out if the daughter was actually the daughter. [male, 21]

**OBJECTIVE 4: VISITORS UNDERSTAND THE ROLE TECHNOLOGY PLAYED IN THEIR ABILITY TO SOLVE THE CRIME AND RECOGNIZE THAT TECHNOLOGY PLAYS A SIGNIFICANT ROLE IN FORENSIC SCIENCE INVESTIGATIONS**

Slightly less than two-thirds of interviewees achieved a developing level in their understanding of the role technology plays in forensic science investigations—that is, interviewees described the role technology played in their ability to solve the Web Adventure crime and provided one general example from their experience (see the first quotation below). One-quarter achieved a below beginning level—that is, interviewees could not discuss the role technology played in their ability to solve the crime or provided a literal account of the technology they encountered on the Web site (e.g., used a computer). The remaining few achieved an accomplished level—that is, interviewees described the significant role technology played in their investigation, using specific details, and sometimes provided an example of how advances in technology enable accurate or efficient investigations (see the second quotation).

Being able to use the various types of scientific instruments like the microscope or the spectrometer or the various other things they had in the lab—those give you the ability to see things that you would not be able to see without the technology. [male, 63]

I think [technology] played a huge role. The [Web Adventure] shows you that you need the different computers, the different stations and microscopes to get the correct results with the DNA. They actually have a big kiosk, CODIS, for missing people or people who committed previous crimes. It would be pretty hard to keep track of everything [without it] and it makes everyone's life a little easier. . . . What was most interesting was the DNA and using the chemicals to figure out the fingerprints and how accurate technology can be for matching our DNA to [evidence] left around. [male, 20]

**OBJECTIVE 5: VISITORS WILL UNDERSTAND THE ROLE HUMAN JUDGMENT PLAYS IN CONJUNCTION WITH ADVANCES IN TECHNOLOGY**

Slightly less than one-half of interviewees achieved an accomplished level in their understanding of the role human judgment plays in conjunction with advances in technology—that is, interviewees clearly stated that human interpretation or judgment plays a role in forensic science investigations and acknowledged that forensic scientists use technology, but ultimately must make judgment calls in investigations (see the first quotation below). The remaining responses were equally distributed. Several achieved a developing level—that is, interviewees implied that human interpretation plays a role in forensic science investigations and provided a general example of this role (see the second quotation). Several achieved a beginning level—that is, interviewees primarily described the human role in forensic science investigations as manual (see the third quotation). Several achieved a below beginning level—that is, interviewees did not discuss the role human judgment plays in solving crimes or provided a general description of the role humans play (e.g., humans find suspects).

Humans are extremely important because you need to be able to analyze. It is not just enough to put evidence into a machine. If you have all the pieces of a puzzle, you can have a beautiful picture, but you have to have the person that knows how to put the pieces together so I think it is very important. [female, 48]

I think [humans] have to learn the skills necessary to really look for all the clues and evidence. I think knowing what to look for is probably the biggest thing, and that would require training and experience. [female, 37]

[Humans] would be the one solving the crimes, we would be the one doing the scientific experiments. If humans were not doing it, how would these crimes be solved? [female, 30]

# PRINCIPAL FINDINGS: QUALITATIVE ANALYSIS OF IN-DEPTH INTERVIEWS

## INTRODUCTION

RK&A conducted a total of 119 interviews—all underwent a content analysis of those aspects of participants' experiences not scored on a rubric (i.e., those aspects that did not directly explore forensic science knowledge gained). Among interviewees, 50 were interviewed after visiting the *CSI: The Experience* exhibition (Exhibition-only), 49 were interviewed after visiting the exhibition and using the Web Adventure on the *CSI: The Experience* Web site (Exhibition & Web), and 20 were interviewed after using the Web Adventure (Web-only).

Slightly more than one-half of interviewees were female (56 percent). The first two interview groups—Exhibition-only and Exhibition & Web—were comprised of about one-half children (9 to 17 years) and one-half adults (18 years and older). The Web-only interview group was comprised primarily of adults ( $n = 18$ ). Among all interviewees, ages ranged from 8 to 68 years, with a median of 21. Most interviewees were Caucasian/white (94 percent) and about two-thirds (68 percent) had been to a science museum two or more times in the last year.

RK&A asked interviewees about four aspects of their experience (none of which directly explored interviewees' knowledge of forensic science): (1) interviewees' opinions of their overall experience in the exhibition and/or using the Web Adventure, (2) how interviewees heard about *CSI: The Experience*, (3) what attracted interviewees to *CSI: The Experience*, and (4) what interviewees perceived to be the overall message of *CSI: The Experience*. Findings are presented by these four aspects of participants' experiences and then, by interview group.

## VISITORS' OVERALL OPINIONS OF *CSI: THE EXPERIENCE*

### EXHIBITION-ONLY PARTICIPANTS

Nearly all interviewees expressed enthusiasm when describing their overall exhibition experience and a few said they traveled long distances to see the exhibition again and/or told friends or family they must see it. More specifically, about one-third described the experience as different—in a good way—from other exhibitions because it was an immersive, hands-on experience they found very realistic and in keeping with the *CSI* television shows which they enjoy (see the first quotation below). Another one-third said they enjoyed “figuring things out,” liked that some cases had a surprise ending, and thought it fascinating to learn and experience how real forensic scientists solve crimes (see the second and third quotations). A few said they thought the exhibition was great for families because visitors were encouraged to work in groups and that the exhibition was kid-friendly (see the fourth quotation). The remaining few responses were idiosyncratic (e.g., appreciated that the exhibition was not too gory).

I thought it [the exhibition] was more interesting than the usual [exhibitions] because it was more hands-on. I liked it because what is going on [was] like television with *CSI* and *Dexter*; so you had a more hands-on, creative outlook on an exhibition so it was fun. [female, 20]

I thought [the exhibition] was a lot of fun . . . [like] putting together a puzzle. I enjoy the show so it was nice to play like I was a *CSI*; I thought about doing that as a career. [female, 39]

It was [an] interesting experience the different ways they [CSIs] investigate a crime scene and to learn about all the different scientific methods that they have to detect evidence. [female, 50]

We discussed quitting our day jobs and doing this [CSI] now that we are rookies. I have my two kids here so it was an interesting learning experience for them as well and it was fun to do it as a group so we all had to figure out [and] discuss the evidence that we had [and] looked at it together as a family. [female, 50]

## EXHIBITION & WEB PARTICIPANTS

Interviewees were asked to collectively discuss their experiences in the exhibition and on the Web site. About two-thirds of interviewees described both experiences as enjoyable and their reasons varied widely. Some said they enjoyed the opportunity to solve a crime and participate in a realistic and immersive experience while learning about the different techniques used to solve crimes in real life (see the first quotation below). Several others enjoyed participating in both experiences with their children and appreciated that the experiences were educational and engaging (see the second quotation). A few generally described both experiences as fun, interesting, and something they would like to try again.

I thought [the exhibition] was really fun because it was really detailed; they had a lot of different stations so you could do different things—like there was stuff where you had to compare things visually and stuff where you had to match. It just really improved your skills overall, and then I also noticed that online, [the Web Adventure] also educated you, like you had to read about everything before you did it. So when you were comparing DNA, first you had to read about the DNA, so it was informative and fun. [female, 15]

I [saw the exhibition] with my two kids and we all thoroughly enjoyed the museum experience. That was really great. We also had a lot of fun playing the Burning Star game on the Web site. . . . I guess what I really liked about both the Web site experience and the museum [exhibition] is that they really engaged my kids' imaginations and that the [kids enjoyed the] process of finding clues and solving things and putting things together. Synthesizing an answer was a really positive way to do things. [male, 47]

About one-third of interviewees also drew comparisons between the two experiences, and responses, again, varied. For instance, several said the exhibition was easier to follow because it provided more directional support whereas the Web site was challenging to navigate because they “got stuck” and had to repeat steps to move forward (see the first quotation below). On the other hand, several said they thought the exhibition experience was fun, but not challenging enough, and they appreciated that the Web site covered topics in greater depth and gave them more opportunities to “figure things out” or interact with the characters on the television show (see the second quotation).

I got online to do [the Web Adventure], and I was not able to really figure out how to travel through the Web site interface. I had a difficult time finding out how to get the program from the ‘welcome page,’ where you had to decide where you were going to go next, to the actual case. . . . It is not that I am not tech-savvy; I actually design Web sites and direct an online teaching program worldwide, so we are pretty savvy when it comes to technology and Web site interfaces. I think there are some clarities needed in defining the user's process when it comes to the online interface. I would not say the same about the exhibition. The exhibition was handled very well. We had plenty of help around. [male, 60]

At SMM, I personally found that they were doing it all for us, and there was really nothing for us to solve, whereas [with] the online [Web Adventure], they did not really talk you too much through it; it was more that you had to try and figure it out more for yourself and so it was more of a challenge. [female, 19]

### WEB-ONLY PARTICIPANTS

When asked their overall thoughts about their experience with the Web Adventure, one-half of interviewees said they liked learning more about the different procedures involved in collecting evidence and solving crimes; a couple of these were a parent or teacher who thought the Web site was a great educational tool for teaching science (see the first two quotations below). Several interviewees—all recruited at SMM to use the Web Adventure—said they had difficulty navigating the Web site and collecting evidence needed to solve the crime; they further specified that it was not always obvious what they were supposed to do next (see the third quotation). The remaining responses varied; a few commented generally about the Web Adventure, saying it was fun or interesting because it so closely mirrored the television show or was about solving crimes, and a few—all recruited online—said the Web Adventure could have been more challenging (e.g., wanted more evidence to sort through).<sup>19</sup>

I learned a lot doing the pre-lab stuff; I mean I watch the [CSI] show all the time and I thought it was fun to learn how to do everything and what the process is like. I thought the game was pretty realistic going back and forth between crime scenes and the lab and finding out what can be done after [you find] everything. The Web site did a pretty good job of explaining how everything was done. [male, 20]

I thought the science was very good; I am actually a teacher and I wanted to solve the case to make sure that it was something appropriate for my students. They [are] studying a forensic science unit, so I actually had my whole class doing [it]. I thought it was very good, very well put together, very well done. [male, 40]

[The Web Adventure] was difficult to solve but I managed to do so. Some of the clues were a bit hard to find and asking [the character] for help was not really much of a help. For example, when you asked him ‘is there any more evidence to be found here?’ he would say, ‘no, I think we are done here,’ and then would not give any more hints as to where [to go next]. [female, 21]

## HOW VISITORS HEARD ABOUT *CSI: THE EXPERIENCE*

### EXHIBITION-ONLY PARTICIPANTS

About one-third of interviewees said they heard about the *CSI: The Experience* exhibition by word-of-mouth (e.g., through a friend or family member). Another one-third said they heard about the exhibition through an advertisement (e.g., billboard, television, radio, newspaper, or hotel pamphlet). Of the remaining interviewees, a few said they saw an advertisement for the exhibition on a visit to Science Museum of Minnesota (SMM) or its Web site, a few said they received an e-mail notification or flyer about the exhibition as part of their SMM membership, and a few said they chose to visit SMM for another reason and noticed the exhibition.

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<sup>19</sup> Subtle yet distinct differences existed in visitors’ comfort level with the Web Adventure, depending on whether they were prompted to use the Web Adventure (i.e., recruited at SMM) or used it unprompted (i.e., recruited online).

## EXHIBITION & WEB PARTICIPANTS

About one-third of interviewees said they heard about the *CSI: The Experience* exhibition by word-of-mouth (e.g., a friend or family member told them about it). One-quarter said they heard about the exhibition through an advertisement (e.g., billboard, television, radio, newspaper, news). Of the remaining interviewees, several said they saw an advertisement for the exhibition on a visit to Science Museum of Minnesota (SMM) or its Web site, a few said they received an e-mail notification or flyer about the exhibition as part of their SMM membership, and a few said they chose to visit SMM for another reason and noticed the exhibition.

## WEB-ONLY PARTICIPANTS

About one-third of interviewees said they discovered the *CSI: The Experience* Web Adventure by using a search engine like Google to find items related to crime-solving, *CSI: Crime Scene Investigation*, the television show, or online games. About one-third were museum visitors recruited at Science Museum of Minnesota (SMM) to use the Web Adventure, and a few said they linked to the Web Adventure from another site (e.g., biology.com). The few remaining responses were idiosyncratic—one person received an e-mail from SMM with a link to the Web Adventure, one heard about it through school, and one was looking at the *CSI: The Experience* Web site and noticed the Web Adventure.

## WHAT ATTRACTED VISITORS TO *CSI: THE EXPERIENCE*

### EXHIBITION-ONLY PARTICIPANTS

Slightly more than one-half of interviewees said they were attracted to the exhibition because of some combination of their interest in *CSI: Crime Scene Investigation*, the television show, and solving mysteries or crimes in general (see the first quotation below). A few said they were attracted by the opportunity to learn more about what forensic scientists do since they are considering it as a career (see the second quotation), a few said they accompanied a family member or friend, and a few said it looked like something interesting to do at the museum that day.

I am a *CSI* fan; I like to watch the show on TV. Solving puzzles is a big thing for our family so we thought we had better check it out. (Okay, can you tell me more about that?) Well, we like to solve riddles and brain teasers and that kind of thing, so it was interesting to show the kids how science helps solve those riddles, not just 'here is the end of it,' but 'here is why those things are,' so that was a good thing for us to do. [female, 42]

I am going into law enforcement and I thought it would be helpful to see this [exhibition]. (Okay, can you tell me more about that?) Since this is my first year in college for law enforcement, we thought it would be a pretty cool thing to come up and see [the exhibition] and relate it to the kinds of things I am doing in school. [male, 19]

### EXHIBITION & WEB PARTICIPANTS

About two-thirds of interviewees named some combination of their interest in *CSI: Crime Scene Investigation*, the television show, and solving mysteries or crimes in general as the reason they were attracted to the exhibition (see the quotations below). Several said they like coming to SMM and the exhibition looked like something interesting to do at the museum that day. A few said they were attracted by the opportunity to learn more about what forensic scientists do since they are considering it as a career, and a couple said they accompanied a family member or friend.

I watch *CSI* and I really like all the characters in it. I think it was interesting because you get to learn how to be a crime scene investigator and get to [find out] how to use [things], like when you got to go see the body, they showed you how to cut [the body] open and look inside and they showed you how to use the fingerprints and stuff. That was really fun. [male, 60]

I have always enjoyed watching *CSI*. I have always been into the whole criminal thing and trying to solve cases and all that, so just watching the television shows, [the exhibition] interested me and I thought it could be fun. (Okay, can you tell me more about that?) In school, I took a forensic files class, and that class was pretty fun, so I thought I would enjoy doing the *CSI* thing. [female, 19]

## WEB-ONLY PARTICIPANTS

About one-half of interviewees named some combination of their interest in *CSI: Crime Scene Investigation*, the television show, and solving mysteries or crimes in general as the reason they were attracted to playing the Web Adventure. Most of these further specified that they were drawn by the realistic nature of the Web site and the variety of things required to solve the crime (i.e., it was a good challenge) (see the quotations below). About one-third were recruited at SMM to use the Web Adventure, a couple were teachers who liked the Web Adventure because it demonstrated science in a challenging and interesting way, and a couple completed the Web Adventure as part of a class or school assignment.

I think it was the ability to be able to do things hands-on, to be able to really not just watch it, but really be a part of it, and you feel that you are the one collecting the evidence and you are actually at the lab—that more approachable type effect. You are not just watching somebody in a show doing it; you actually get to experience what it is. [female, 48]

What attracted me to looking at [the Web Adventure] was that it was really well done, very professionally done, and you did not have to know anything about the show to do the project. . . . [There were] a lot of different activities. . . . It was very easy to navigate. It was not incredibly easy either, because, usually these [kinds of things] will be done in five minutes, and it was not [too] easy, and so that was actually something that is very attractive for us. [female, 41]

## PERCEIVED OVERALL MESSAGE OF *CSI: THE EXPERIENCE*

### EXHIBITION-ONLY PARTICIPANTS

When asked what they thought the exhibition was about, most interviewees mentioned something about solving crimes. About one-half specified that the exhibition was about how forensic scientists solve crimes and the different sciences that go into crime investigations (see the first quotation below). About one-third were less specific, stating that the exhibition was about using clues or evidence to solve crimes or mysteries (see the second quotation). A few spoke more generally, explaining that the exhibition teaches visitors observation skills and helps them realize that details can be important in solving crimes (see the third quotation). The remaining few responses were idiosyncratic (e.g., the exhibition was about revenge or being careful who you trust).

What would I say it is about? I see [the exhibition] as using scientific tools and deductive reasoning, definitely deductive reasoning, and when it is appropriate, inductive reasoning, but mostly deductive reasoning to solve crimes. It was interesting to find out how many scientific tools we have today—the DNA databases, the CODIS database, etc. [female, 67]



[I think it is about] crime scene investigators and collecting evidence and putting puzzle pieces together to find the murderer. (And what makes you say that?) It is based on the TV show, and that is what they do in real life. [female, 23]

[The exhibition] is about science, about observing the things around you that could be everyday evidence or everyday common things that actually become evidence for you, taking a closer look and trying not to bypass [evidence], but look at it for anything out of the ordinary or something that would tie your clues together so that you would come out with a final answer. [female, 36]

## EXHIBITION & WEB PARTICIPANTS

When asked what they thought the exhibition and Web site were about, most interviewees mentioned something about solving crimes. About one-third specified that the exhibition and Web site were about how forensic scientists solve crimes and the different sciences that go into crime investigations (see the first quotation below). About one-third were less specific, stating that the exhibition and Web site were about using clues or evidence to solve crimes or mysteries and giving visitors the opportunity to do so (see the second quotation). Several said the exhibition and Web site were trying to teach people about careers in forensic science (see the third quotation). A few spoke more generally, stating that the exhibition and Web site sought to make learning science fun, and the remaining few responses were idiosyncratic (e.g., the exhibition or Web site was about knowing who to trust or had a western theme).

The main thing that both [the exhibition and Web Adventure] were about—they both deal with the same thing—[they] give people an understanding of how you use science in problem-solving and investigation and solving crimes. [male, 42]

I think [the exhibition and Web Adventure] are about putting connections together—figuring out stuff as you go through the process—and being able to solve puzzles. [Evidence] may not be at first what it appears to be, it may be something else, and there is something more to it. [Investigators] have to look and search and really find out what it could be. [female, 26]

The people who developed [*CSI: The Experience*] might have wanted to raise awareness about a job in forensic science, and, maybe, they are looking for people out there who might want to further their interests in those subjects like showing that you could do what they do on TV. (And what makes you say that?) I thought it was geared a lot towards learning and letting you know that there are lots of jobs that you could do and different jobs, too. [female, 25]

## WEB-ONLY PARTICIPANTS

When asked what they thought the Web Adventure was about, most interviewees mentioned something about solving crimes. About one-half said the Web Adventure was trying to provide individuals with a fun, interactive experience by offering users the opportunity to do what the *CSI: Crime Scene Investigation* characters or real-life crime scene investigators do (see the first quotation below). Slightly more than one-third specified that the Web Adventure was about how forensic scientists solve crimes and the different sciences that go into crime investigations (see the second quotation). The remaining responses were idiosyncratic (e.g., the Web Adventure was about crimes that happen in Nevada).

I would say [the Web Adventure] was about solving a mystery or solving a crime especially for those who are crime scene enthusiasts, people like me, because I teach science normally, but I have a passion or interest in this. So, it is something that is entertaining, but the main thing is it is for the people who are interested, instead of just sitting in front of the TV watching a show, they can be a part of it. (And what makes you say that?) It is very interactive and the user can do a lot of things, like click on the map, ask questions, learn about certain things. . . . So the way

it allows the user to maneuver through the different rooms and the different locations and things like that. [female, 34]

[The Web Adventure] is introducing people, in a very hands-on way, to the idea of criminal forensics and forensic science and really giving people an opportunity to see what kind of science the investigators actually go through. (And what makes you say that?) Because it really opened my mind that the littlest things that you could find at a crime scene or at different places or just a small bit of information can lead you to a conclusion that you did not really think about in the first place. [male, 37]

# PRINCIPAL FINDINGS: PROCESS EVALUATION

## INTRODUCTION

*CSI: The Experience (CSI)* was an ambitious and innovative project that combined the resources of many partners. To document the effectiveness of this complex partnership and examine the project's collaboration model, RK&A conducted a process evaluation. Data were collected during two phases of the project's lifecycle—in the early stages of the collaboration, once the project was underway (Fall 2007), and after the *CSI: The Experience* traveling exhibition opened to the public (Fall 2008)—to understand how the process evolved and whether partners' attitudes toward the collaboration changed over time.

Specifically, the objectives of the process evaluation are to explore:<sup>20</sup>

- ◆ To what extent project partners understand the goals and objectives of the *CSI* project;
- ◆ To what extent the partners' roles and/or responsibilities are aligned with their expectations and motivations for participating in the project;
- ◆ Partners' perceptions of achieving project goals;
- ◆ Strengths and shortcomings of collaboration—as a process;
- ◆ Which collaboration strategies enabled partners to realize the project's potential; and,
- ◆ Which collaboration strategies should be replicated for future projects.

In the process evaluation, RK&A obtained feedback from project partners, including representatives of Fort Worth Museum of Science and History (FWMSH), Rice University's Center for Technology in Teaching and Learning, CBS Consumer Products, American Academy of Forensic Sciences, Bob Weis Design Island Associates, and Oregon Museum of Science and Industry (OMSI). In phase one of the evaluation, RK&A conducted a group discussion with aforementioned partners who attended a *CSI* advisors' meeting at FWMSH. Additionally, RK&A conducted three telephone interviews with key partners who were not able to attend the advisors' meeting. A total of thirteen partners participated in phase one of the evaluation. In phase two, RK&A conducted eight telephone interviews with some of the same partners (see Appendix D for a list of phase one and two participants).

RK&A has organized the following presentation of findings based on the objectives of the study. As such, findings from phase one and two of the evaluation are discussed together; however, we highlight any specific similarities and differences between the two data sets where appropriate.

## PARTNERS' UNDERSTANDING OF PROJECT GOALS AND THEIR PROJECT ROLE

In this section, most comments were elicited during phase one of the evaluation, at which time the project had just started and partners were becoming acclimated with their project roles.

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<sup>20</sup> Since data were collected at two different times during the project, objectives were developed for each phase. In this list, RK&A collapsed objectives from phase one and two of the evaluation.

## PROJECT GOALS

When asked about the goals of the *CSI* project, there was general consensus among partners. During the group discussion, partners rarely contradicted each other's comments or restated them; instead, they usually built on previously stated comments by offering additional ideas or anecdotal details.

Specifically, partners said the project is meant to provide people with fun and engaging real-world science experiences (see the first quotation below). Some elaborated by noting more specific goals such as to explain the scientific method, encourage close observation, or convey the use of technology in solving crimes (see the second quotation). Several mentioned that the project also aims to encourage young people's engagement with science and exploration of scientific careers (see the third and fourth quotations).

It [*CSI*] is a designing collaboration and immersive experience that tries to meld science education with entertainment—it strives to convey information while at the same time being a fun environment.

[The project aims to teach people about] good scientific principles, scientific methodologies, the power of observations, and then technology, applying them to a process ultimately resulting in determining who can be included or excluded from a crime.

We are trying to create an engaging experience where people have fun, and we want them to learn something; we are using the hook of the show—the validity of the show, because it does bring a lot of valid science to the table—as a way to get [the target] age group and older excited and inspired by this kind of crime-solving puzzle. . . . We are really trying to give them that adventure that could lead to deeper and further learning.

I think it is also about exposing people to what it takes to have a career in one of the STEM fields, and I think that is a really important secondary off-shoot of this as well.

## ALIGNMENT OF THE *CS*/PROJECT WITH PARTNERS' MISSIONS<sup>21</sup>

When asked whether the project fit in with their organization's mission, most said it did. Most often, partners said the project fit into their mission by using technology to enhance learning, engaging people in science learning and inquiry, or communicating information about forensic science or scientific careers (see the quotations below).

Our mission is to look for ways to use technology to increase post-visit connections for visitors and so, in that way, this was an excellent project to do that because of the use of the very popular *CSI* branding as one of the pieces that encourages that sort of post-visit connection.

We are a professional organization that is made up of forensic scientists whose goal is to include education and communication in the forensic sciences, so we have a stake in this . . . from that standpoint of furthering education of the general public regarding forensic science.

## BENEFITS TO BE ATTAINED FROM PARTICIPATION IN THE *CS*/PROJECT

Partners were also asked to discuss the ways in which they expected the project to benefit their organizations, and many discussed two primary benefits—the increased visibility of their organization and the audience they would gain from working with a high-profile partner—CBS and the *CSI* brand

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<sup>21</sup> Findings in this section are from phase two of the evaluation.

(see the first quotation below). Others discussed the benefit of building lasting relationships with partners and strengthening their own teams through collaboration (see the first and second quotations).

It is a high-visibility project because of its partnership with the television show; so I think, for any company that brings that kind of association, it is always a plus. . . . I think, on that level, we are really excited but [we are also excited] to be able to have that collaboration and to forge those relationships.

It may sound silly, but it is cool to leave some place with a feeling that this is actually a network that is going to be useful. . . . So many times you go to meetings and everybody is so hyped about the project and says, ‘Yeah, I am going to keep in contact. We are going to do this and that,’ and then it fizzles and fades away. It makes you a little jaded. But, I really feel excited about this. I think it is going to be very useful for everyone.

### EXPECTATIONS OF PROJECT ROLES

Partners were also asked to describe their expectations about their project roles. Although responses varied, most commented about the size and scope of the project. Some said they were surprised by how big the project became, citing the larger-than-expected audience for the exhibition and Web site (given the connections to CBS and *CSI*) and the number of partners involved with high levels of expertise. Because of the differing expectations of the size and scope of the project, partners’ roles were also different than expected. For instance, one participant said his or her role was bigger than expected, while another said his or her role was smaller than expected (see the quotations below).

I do not think I initially perceived my role to be quite as large as it has turned out to be, so that is my candid answer. I think that I always imagined it [the project] was about trying to come up with an integrated experience that is uniquely trying to intertwine several different story lines together and bring those to life in a way that is engaging and educational; so, on that level, it has been what I expected, but I do think it is a hugely ambitious project and it has definitely been quite a gorilla to pull together.

I think initially we expected to do a little bit more in terms of the number of activities and other things, but in the end our scope was slightly reduced and a lot of that was budget constraints and that was fine.

### ACHIEVEMENT OF PROJECT GOALS

In the second phase of the evaluation, partners were asked whether the project had achieved its goals, and all agreed that it had done so. In phase one, partners described several project goals, including engagement in science learning and exploration of scientific careers. In phase two, partners focused more specifically on having achieved the goal of engagement in science learning. For instance, some said the project achieved the broad goal of entertaining audiences while providing a hands-on, authentic science-learning experience, while others said the project was successfully designed to accommodate the target audience’s level of learning (see the first and second quotations below). Additionally, a couple partners said the project successfully provided complementary Web- and exhibit-based learning environments (see the third quotation).

We were able to stay true to what we really wanted to do, which was to engage kids and families in science inquiry and use forensic science to do that.

We worked long and hard with [the DNA expert] to capture what he felt was important, to pare it down and to translate it into a language that would be appropriate for the audience, and I think we were really successful in doing that.

This grant is really about creating a Web- and exhibit-based environment and then doing research on how people learn in those environments. So I think that from an assessment point that is how we approached it, how we felt good about it, and we were able to maintain that throughout the project.

When asked how, if at all, the project fell short of achieving its goals, a few partners said the project did not meet their *personal* expectations. For instance, a couple said the collaboration failed to meet their goals for the DNA component of the exhibition, and one said the design elements fell short of achieving their goals (see the quotations below).

From the DNA standpoint, I do not think we did as good a job as we wanted to. It has been complicated, but one of the tensions of working with the show is that both the show producers and even our exhibit designer wanted it to be very *CSI*-like, so when you are in the lab you feel like you are in the *CSI* lab. My inclination was to put out more general information about genetics and some of the biology behind genetics, and they were going ‘well, that kind of ruins the fanatic nature of this exhibit and you are less likely to feel like you are on *CSI*.’

There were certain things in terms of a traveling exhibit[ion] that we suggested happen, that we wanted to have happen, and that were ultimately decided against due to the designers wanting a different look.

## STRENGTHS OF THE COLLABORATION

In this section, partners talked about the strengths of the collaboration with regard to achieving project goals. Findings are presented by phase one and two to demonstrate similarities and differences in partners’ responses over the course of the evaluation.

### PHASE ONE RESPONSES

When asked to discuss specific strengths of the collaboration, partners most frequently discussed the high caliber of resources and expertise that each partner brought to the project as well as partners’ commitment and flexibility (see the quotations below). Other responses were idiosyncratic.

In some ways, it has helped us to have CBS because we did not have to decide on characters, the look and feel, the color pallet, or fonts; those came with the package so to speak. So, in that sense, we were able to focus our efforts on content.

The strengths of it? Lots of really good people committed to doing something as good as it can possibly be; I think that Fort Worth has done a pretty darn good job of letting go of a lot of details that they might otherwise have wanted to be more closely involved in.

### PHASE TWO RESPONSES

As would be expected towards the end of a project, partners easily identified strengths of the collaboration and talked in more detail than they had in phase one. Several described the importance of having created solid foundations for collaboration early in the project. For instance, a few partners identified the importance of having clearly outlined project elements, such as goals and timelines, while a

couple identified the importance of having in-person meetings with various partners in the beginning phases of the project (see the quotations below).

I think it was clear from the beginning what the goals were and that everyone respected the other partners and their ability to succeed in reaching those goals. I think that was the key.

. . . very early in this project, even though we have people in California and Portland, Oregon, and Fort Worth, we arranged for a lot of face time with people working on the project so they could know who we were.

Partners also said that frequent and open communication throughout the project was beneficial (see the first quotation below). Specifically, partners said that effective phone and e-mail communication helped project goals progress despite geographic distance, which was a concern throughout the project (see the second quotation).

We would talk through what was expected for the week, really trying to have as open a communication as possible with as many different partners as possible.

I think [that] any time there was a question of what we should do, we would always have a conference-call and hash it out. I was never reluctant to pick up the phone and say, ‘Hey let’s talk this out because we might have a problem if we don’t.’ I think in every case [this was done], it [the problem] always got resolved.

As in phase one, partners recognized the benefits of collaborating with a diverse array of experts. This was often considered a strength because partners’ roles could be defined by each partners’ expertise (see the quotation below).

For each segment [of the project], we had a partner that was an expert in that particular area, and that worked really well.

## CHALLENGES OF THE COLLABORATION

In this section, partners mention the challenges of the collaboration with regard to achieving project goals. Findings are presented by phase one and two to demonstrate differences in partners’ responses over the course of the evaluation.

### PHASE ONE RESPONSES

When asked to discuss the challenges of the collaboration process, many partners said that the accelerated timeline was difficult (see the first quotation below). More specifically, some said the scope of the project itself, especially in relation to the tight timeline, was challenging—certain aspects could not be completed or people were unavailable (see the second quotation).

It is time. Just the compression especially because, in our way of doing business, it is always about a two-year process [in order] to be thoughtful about [projects]. We slammed that down to one year and a half.

Given the scope of the project and typical NSF timelines, [the project] was heavily compressed, so lots of things got automatically dumped out of the process that would normally happen; like there was very little in the way of formative evaluation done for any of the interactive elements. .

. . . We would have done extensive formative testing on all of these things, but that opportunity did not exist.

Partners also said that communication was challenging given the number of partners involved in the project and the geographic distance between partners (see the first quotation below). Partners desired greater communication so they could feel that they were working together towards a greater goal and not in isolation, especially for the sake of producing a coherent exhibition and Web site (see the second, third, and fourth quotations).

[There is] so much nuance in design, it is really hard to do, and it is hard to do long-distance; it is hard to do over the Internet where we send e-mails back and forth; it would be better if we were all in a room together or could run down the hall and say ‘take a look at this; I think it should look like this picture in this magazine.’

I think [there needs to be] maybe . . . either by e-mail or conference-call or whatever the system would have to be . . . a more consistent back and forth between everyone so that we could all feel we were moving forward together.

I think in the truncated time frame, communication has been occasionally a problem, absolutely, and continues to be so. I think there has been a desire for more time spent at the beginning in terms of integration, and I am talking specifically between Fort Worth and Rice University; just a little more time spent on how we were going to integrate those experiences and trying to make them feel more like parts of the same pie instead of separate components.

So much is being developed in isolation of other people or other things, and at this point in the project, there are a lot of people doing various things, but nothing is being evaluated in context with one another.

Additionally, partners were challenged by the dynamic among partners. A few partners said the reconciliation of the motivations and goals of two seemingly different worlds (education and entertainment or commercial and non-profit) was challenging (see the quotation below).

This [project] really is a blending of the entertainment world and something that has not been part of the entertainment world [the non-profit world], and it is going to be a really interesting hat trick to find out if we can pull it off and stay true to our core values which are accuracy for learning science content . . . [and] blend it with this entertainment industry that really has a different set of agendas but provides a very powerful tool to be a draw.

## PHASE TWO RESPONSES

When asked to discuss any problematic aspects of collaboration in the second phase, partners named fewer challenges, and some partners did not mention anything as problematic.

Of the challenges mentioned, however, the dynamic among partners proved most challenging. Some spoke about the challenges of balancing partners’ different needs, perspectives, and agendas (see the first quotation below). Some partners said one challenge was partners’ differing perceptions of the projects’ scope and priorities, which was exacerbated by the number of collaborators and communication challenges (see the second quotation).

I think you lose a little bit of . . . I do not know if it is just control, but it is maybe [that] the mission and the passion of your individual organization has to merge with the mission and



passion of others, and so you end up with something that does not quite look like anyone but you are hoping, overall, that it ends up at a higher level.

At times, there was confusion as to the [project] scope—whose scope is it to get microscopes and whose scope is it to get photographs of a picture because there were so many different players.

A few also mentioned logistical challenges, such as the project's timeline and budget (see the quotation below).

There was a big challenge in [terms of] designing at a certain level; they came back to us and we said 'we only have so much money. There is no more money to be found' . . . that was a really hard concept to get across to the design group because I am not sure they ever really had to deal with that before.

## **BENEFITS OF COLLABORATION**

When asked about the benefits of collaboration, nearly all partners spoke more avidly, saying that collaboration is important, if not essential, for producing high-quality work (see the first quotation below). Further, some mentioned that collaboration can be an effective way to tackle a project since you can pull from everyone's strengths, and a few valued collaboration for generating new ideas, thus pushing projects to greater heights (see the second and third quotations).

It [collaboration] allows different institutions with specifically different strengths to bring their best strengths to the table to give a very high-quality product in the end.

I think NSF and we are getting a bigger bang for our buck through the collaboration. We sat down with Rice University and, in talking about framing a learning environment through those earlier conversations, we were able to create two learning environments, one a Web site and one an exhibition. I think there were efficiencies in the way we did it by coming around the table early on and talking about goals early on.

Institutions tend to think along the same lines and in order to really create a new 'think-different' type of product that no one has really seen before, it really requires a collaborative effort because there are so many different creative minds behind one idea, behind one project.

## **SUGGESTIONS FOR FUTURE COLLABORATIONS**

When asked to provide words of wisdom about effective collaboration strategies for future partnerships, partners gave several recommendations.

Increased clarity of goals, partners' roles, and timelines was the most commonly and clearly articulated recommendation offered by partners (see the first quotation below), and a few partners reiterated that the clarification should happen as early in the process as possible. Others underscored the idea that face-to-face gatherings, especially for initial meetings, were critical for establishing trust and confidence (see the second quotation).

Clarity of roles is always critical and then clarity of scope helps. When I say scope it means exactly ‘what are we trying to do here exhibition-wise and Web-wise?’ and ‘what kind of resources do we have to have to make that happen?’

The only way we have ever been successful doing that [collaboration] is having face-to-face time and, after that, you can rely on things like conference-calls and e-mails and discussions. But, the first necessary prerequisite is to develop the relationship.

Partners also value choosing collaborators in relation to clearly articulated project goals (see the first quotation below), and they recommend that collaborators be sensitive to each others’ diverse perspectives (see the second quotation).

The first thing that has to happen is that the goals of the project have to be clearly understood, clearly stated and accurately understood, and then when you start the collaboration, there has to be a genuine attempt on the part of anyone who is interested in being a part of this thing to determine whether or not the fit is going to be right for them.

There has to be a sensitivity that every partner is there because they bring value to the project. Every partner has a different organizational culture, has different and varying expectations, so you really try to go into it understanding each partner but being very clear about the goal.

Partners also said that, while challenging, there is value in collaborating with partners from different sectors, particularly media-savvy groups that can provide enhanced visibility for a project.

# APPENDICES

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## APPENDIX A: PARTNERING ORGANIZATIONS

- ◆ Forth Worth Museum of Science and History, Fort Worth, Texas
- ◆ Science Museum Exhibit Collaborative
- ◆ American Academy of Forensic Sciences, Colorado Springs, Colorado
- ◆ Crime Lab, Tarrant County Medical Examiner's Office, Fort Worth, Texas
- ◆ DNA Identity Lab, The University of North Texas Center for Human Identification, Denton, Texas
- ◆ Bob Weis Design Island Associates, New York, New York
- ◆ Rice University's Center for Technology in Teaching and Learning, Houston, Texas
- ◆ CBS Consumer Products, *CSI: Crime Scene Investigation*, New York, New York
- ◆ Exploration Place, Wichita, Kansas
- ◆ Dakota Science Center, Grand Forks, North Dakota
- ◆ Oregon Museum of Science and Industry, Portland, Oregon
- ◆ Brad Larson Media, Inc., Canton, Massachusetts
- ◆ Boys and Girls Club of America, Atlanta, Georgia

## APPENDIX B: WEB ADVENTURE COMMENTS

I REALLY liked this game. It's really thorough and it's not just clicking places. I really can't wait for the next episode and I hope it comes soon. This game is actually helping me decide which area of a criminal investigation I want to pursue!

Wonderful, interactive site. I used it for our new Forensics class. The students were enthralled. Your graphics were awesome.

I really liked this Web Adventure because I am thinking about being a forensic scientist when I grow up and this helped me learn more about the different fields, because I'm not completely sure which one I want to pursue. I still don't know, but it helped me hear more about each one, now I think I like toxicology.

I have to say, I learned a lot on this site. I'm currently enrolled in ROP law enforcement and it was an assignment to research our choice of career. I just discovered I'd like to work in Forensics. I'm a bit of a science nerd, and I think it would be a fun job choice. Thank you for making this site fun and educating.

I teach Forensic Science at the high-school level and found this site to be a great resource. I created a question/answer sheet for my students as they go through Case 1 and am ready for the next case. When do you expect Case 2 to be available?

I just wanted to say that it was a great idea to set up a Web site like this that we can use to learn and practice on. I myself want to become a CSI in the future and next year I'm going to college in the Netherlands to study forensics. But, this Web site has encouraged me more to become a CSI. Thank you!

This Web project has been fun for me. It has taught me some really neat stuff about forensic investigation. I hope you will continue to keep updating it. I'd really like to see some other forensic concepts and a few existing concepts expanded on. I'd really like to learn about them in this interactive way. Thank you for making this Web site, and keep up the good work!

I loved this site. It was so fun. The activities were great; I loved every single one of them. I loved going through the rookie training and learning all I can about forensics, ballistics, toxicology, and all the other things you are offered to learn. I love chemistry and forensics because I would like to go into that field someday. After you pass being a rookie, do you get to go into some other form of training?

I think the site is brilliant and will be showing my science-mad daughter who will be able to learn loads whilst having fun. Can't wait for future projects on it.

As a teacher of forensic science, this Web Adventure was perfect for those of us who can't make it to the exhibition. The students loved it and walked away feeling as though they learned quite a bit. Thank you for providing such a wonderful, fun, interactive educational tool!

*CSI: The Experience* has provided such a wonderful opportunity for our eighth-grade students. We have devised lessons surrounding forensic science, criminal justice and the scientific method. Through our many lessons students are solving problems, challenging their own perception of reality, and working together as a team.

This Web site really helped me understand forensics better. It's always been a field in which I wanted to study!

It was a good experience; the only major downside is that it was a little too easy for people over 14, but still a great experience.

Hi! I am very interested in your online games because CSI is my career path; I was just wondering when will case three be removed from under construction? I really enjoyed your first two games; I am waiting to play your third case. I check your site everyday to see when your site is open.

This was a great experience to learn how the people of CSI actually do their work. I was very pleased with the activity that I did. I hope to come back in the summer and play part two of this activity.

This Web site is excellent! One of my students wants to do an independent study on the field of forensics, and this program provides a comprehensive and student-friendly overview. Thank you so much!

Thank you for making activities like this. It helps people like me understand how something goes. It is very educational and it could be used for education for high-school students all over the world. This should be showed and used all over the world by anyone . . . great job.

This game was so much fun!!! I really want to be a CSI agent. It looks like fun, but I know it will be hard work and I am willing to work for as long as I need to. I also learned lots of things I didn't know before, like how to identify what bullet goes to which gun. That part was tricky but I understand it. My class is studying CSI. So far, we have learned codes and how to identify fingerprints. Now we know how to do many other things because of this game.

This site is awesome! It was very fun to find the evidences, "talk" to the suspects, and find out who's the criminal. It was also a nice experience to see and learn the basic concepts of handling the CSI equipment. Overall, I really enjoyed these activities! It would be nice if more of these cases were posted online for us to solve.

Wow! This Web site is really cool! I learned so much and enjoyed it all at the same time. I think all kids should be able to learn this way. They are more likely to understand and remember things this way. It's really fun and interactive.

I really enjoyed this activity. I am thirteen years old and always wanted to be involved with forensics. This activity gave me the opportunity. Thank you.

## **APPENDIX C: TIMING AND TRACKING OBSERVATION FORM**

**REMOVED FOR PROPRIETARY PURPOSES**

## APPENDIX D: PROCESS EVALUATION PARTICIPANTS

### PHASE ONE

- ◆ Charlie Walter, Fort Worth Museum of Science and History
- ◆ Chip Lindsay, Fort Worth Museum of Science and History
- ◆ Brandi West, Fort Worth Museum of Science and History
- ◆ Megan Adams, Fort Worth Museum of Science and History
- ◆ Colleen Blaire, Fort Worth Museum of Science and History
- ◆ Kathy Barthelemy, Fort Worth Museum of Science and History
- ◆ Ronald Singer, M.S., American Academy of Forensic Sciences
- ◆ Art Eisenberg, DNA Identity Lab, The University of North Texas Center for Human Identification
- ◆ Mellissa Berry, Bob Weis Design Island Associates
- ◆ Leslie Miller, Rice University's Center for Technology in Teaching and Learning
- ◆ Corinne Marrinan, CBS Consumer Products, *CSI: Crime Scene Investigation*
- ◆ Laurel Zhang, Exploration Place
- ◆ Jennifer Beckman, Dakota Science Center
- ◆ Ben Fleskes, Oregon Museum of Science and Industry

### PHASE TWO

- ◆ Charlie Walter, Fort Worth Museum of Science and History
- ◆ Brandi West, Fort Worth Museum of Science and History
- ◆ Leslie Miller, Rice University's Center for Technology in Teaching and Learning
- ◆ Maryann Martin, CBS Consumer Products, *CSI: Crime Scene Investigation*
- ◆ Ronald Singer, M.S., American Academy of Forensic Sciences
- ◆ Art Eisenberg, DNA Identity Lab, The University of North Texas Center for Human Identification
- ◆ Ben Fleskes, Oregon Museum of Science and Industry
- ◆ Brad Larson, Brad Larson Media, Inc.

## **APPENDIX E: PROCESS EVALUATION GROUP DISCUSSION GUIDE**

**REMOVED FOR PROPRIETARY PURPOSES**



## **APPENDIX F: IN-DEPTH VISITOR INTERVIEW GUIDES**

**REMOVED FOR PROPRIETARY PURPOSES**

## **APPENDIX G: PROCESS EVALUATION INTERVIEW GUIDES**

**REMOVED FOR PROPRIETARY PURPOSES**

**APPENDIX H: TIMING AND TRACKING STATISTICS**

**REMOVED FOR PROPRIETARY PURPOSES**

## **APPENDIX I: RUBRIC-SCORED INTERVIEW STATISTICS**

**REMOVED FOR PROPRIETARY PURPOSES**

**APPENDIX J: VISITOR BEHAVIORS FOR EACH EXHIBIT (BY SECTION)**

**REMOVED FOR PROPRIETARY PURPOSES**

**APPENDIX K: INTERVIEW SCORING RUBRIC WITH REPRESENTATIVE QUOTATIONS**

**REMOVED FOR PROPRIETARY PURPOSES**