Field Guide: Golden Gate National Recreation Area

Nell Cohen

New York University

REVISED: May 13, 2015

Background

Field Guide is a mobile app designed for use primarily by self-guided individual adults or groups during visits to the Golden Gate National Recreation Area (GGNRA). The Field Guide concept could easily be adapted and applied to other National Parks. Because the GGNRA is a vibrant focal point for many overlapping human and natural histories, this park will serve as a perfect example to consider how the Field Guide design model could help to facilitate nuanced self-guided learning experiences within the length of an afternoon.

The GGNRA, established in 1972, includes a large portion of the San Francisco Bay Area region and encompasses many important historical and natural sites. It is also an enormously popular destination: an estimated 17 million people visit annually (National Park Service, 2014, p. 22). The National Park Service published a Long Range Interpretive Plan for the GGNRA in 2014, intended as the primary document for the NPS' interpretive media and programming in this park for the next decade. Six primary interpretive themes were identified that address the special significance and features of the park's lands. These interdisciplinary and overlapping themes (*1. Geological Forces; 2. Islands of Refuge; 3. Ohlone & Coast Miwok; 4. Military*

Legacy; 5. Freedom, Justice & Equality; 6. Scenic Landscapes) combine knowledge from geology, ecology, and social, cultural, and military history to convey a complete understanding of the past and present of the Golden Gate. While these themes need not provide a precise template for all of the interpretive media designed for the GGNRA, they serve as indicators of the overarching threads of knowledge that are considered by the NPS to be most important to communicate to GGNRA visitors.

Design Challenges

Designing interpretive and instructional media for the GGNRA poses several challenges related to prior knowledge, cognitive load, and motivation. First of all, given the interdisciplinary nature of the relevant subject matter, the information that visitors encounter through the learning experience will overlap many different domains in which visitors may have little-to-none specialized knowledge. In some cases, the visitors' ability to interpret information and experiences in the GGNRA may rely on prior knowledge beyond that which may be consistently provided by the interpretive panels and plaques found throughout the GGNRA. For example, how could a visitor contextualize an observation of Cold War-era battery ruins without background knowledge about the Bay Area's relationship to the Cold War, or without knowing what batteries are? Similarly, wouldn't most visitors have some difficulty correctly identifying a Pygmy Nuthatch without first knowing how to identify birds in general? It may be impossible to teach such specific skills and knowledge from several disciplines simultaneously within one learning environment. A "generalist" approach, utilizing scaffolding, may be most effective. Additionally, given the inherently information-dense characteristics of the environmental and historical content, it will be especially important to communicate the relevant information while

managing intrinsic cognitive load (Paas & Sweller in Mayer, 2014, p. 37) and operating within the limited capacity of working memory (Weinschenk, 2011, p. 48). Furthermore, because learning will be self-directed and self-motivated for most adult visitors, Field Guide will need to provide an intrinsically rewarding learning experience (Csikszentmihalyi & Hermanson, 2004).

Target Learners

While Field Guide could be effectively adapted for classroom field trips and used by families or groups, the primary target learners for Field Guide are the adults of all ages who visit the Golden Gate National Recreation Area for recreational and/or educational purposes, including both tourists and Bay Area residents. Successful educational media for this audience will leverage and focus learners' pre-existing interests, their sense of agency, and—in the case of young adults—help them to apply familiar patterns of thought derived from the digital world to place-based, outdoor learning.

Falk has identified "free-choice learning" in situations where adults voluntarily visit national parks and other such non-formal learning environments primarily in search of some form of personal fulfillment. Research has found that the primary motivations for free-choice learning may be "to satisfy a personal sense of identity, to create a sense of value within the world and to fulfill personal intellectual and emotional needs" (Falk, 2005, p. 266). Furthermore, Heimlich & Horr have argued that "visiting a place or a website is usually an indication of preexisting interest and/or bias, which influences their learning in the place" (2010, p. 59). Accordingly, it should be assumed that target learners have some degree of specific interest and personal motivation for learning about the GGNRA, although they may not necessarily have prior knowledge about it.

Similar motivations have been found within the context of learning during leisure tourism. Van Winkle & Lagay, noting that "learning is a well-documented motive for tourism" (2012, p. 339), studied tourists' experiences of, and motivations, for learning. Their ten research subjects ranged in age from twenties to sixties and came from a diverse set of countries (Van Winkle & Lagay, 2012, p. 345). Some of the primary goals participants stated for learning during tourism included gaining a sense of place, understanding a new culture, gaining skills, and self-exploration, while some of the primary features of these learning experiences included freedom and flexibility, fun and engagement, reflection, and exploration (Van Winkle & Lagay, 2012, p. 347).

Additionally, educational media for adult, self-directed learners should provide guidance while simultaneously empowering learners to identify and fulfill their own learning goals. Writing in the context of andragogy, a theory of learning for adult education, Knowles stated that "human beings tend to feel committed to a decision (or an activity) to the extent that they have participated in making it (or planning it)…Accordingly, a basic element of the technology of andragogy is the involvement of the learners in the process of planning their own learning, with the teacher serving as a procedural guide and content resource" (Knowles, 1980, p. 48).

A digital technology-facilitated, place-based learning experience may be especially appropriate and effective for young adults. Worley has written on the importance of educating the "Net Generation" (adult learners roughly ages 18-35) through visual, multimedia, and digitally mediated environments. Many young adults' ways of thinking, based on a lifetime immersion in the Internet, can be leveraged effectively through place-based learning by focusing their perception of the natural world as a resource similar to what they encounter on the Internet. "From a digitally minded perspective," Worley writes, "nature can be seen as a giant living

library or museum filled with an infinite variety of interesting, touchable, see-able, feel-able, smell-able, and hear-able knowledge, facts, and experiences immediately available to learners" (Walter, 2013, p. 155).

Goals

While Field Guide's broad experiential goal is to facilitate outdoor learning that is personally meaningful and intellectually stimulating, its educational agenda is to increase awareness of, and insight into, the special characteristics of the GGNRA parklands and to produce an "informed" park-going experience.

Fulfillment of this goal necessitates first that the learner will perceive and remember information (primarily visual, verbal, and/or conceptual) about the physical environment they encounter in the GGNRA, beyond that which they would be able to observe directly without guidance. Second, the learner will integrate this new information into his or her overall interpretation of the park's natural and historical characteristics and significance. Learning would be evidenced by the user's ability to contextualize new, related observations in the park *after* use of the app (e.g., being able to identify plants or estimate the date of military ruins).

Through this process, the learner will begin to pick up details, perspectives, and terminology relevant to specific disciplines or knowledge domains (e.g., ecology). There is no specific set of content or skills that users should necessarily be expected to learn, however, because each user will interact with Field Guide in their own way, according to their interests.

Design Solution

Field Guide is envisioned as a mobile app for iPhone and Android, downloadable through the Apple App Store or Google Play Store. Field Guide seeks to deepen and expand visitors' understanding of the park by layering and incorporating expert-prepared factual information relating to the flora, fauna, geology, and social, cultural, and/or military history of the GGNRA, into the visitor's unique firsthand experience in the park. Field Guide leads visitors to the GGNRA to experience the park with a greater sense of purpose, thereby placing them into a state of "flow"—defined by continual, but manageable, challenge—that engenders intrinsically motivated learning and drives prolonged engagement (Csikszentmihalyi & Hermanson, 2004).

Field Guide is a relatively "lightweight" learning tool, providing a subtle but impactful supplement to park visitors' experiences. Avoiding the difficult-to-navigate, text-dense format of conventional field guides, brochures, or Google Maps-based mobile walking tours, Field Guide presents bite-sized information as needed and "on demand." While it is a mobile app with a graphical interface, the intention behind Field Guide is to minimize the user's time spent reading onscreen information or manipulating a digital interface, placing primary emphasis on in-the-moment observation of the user's physical environment and leaving in-depth investigation for post-visit reflection.

In summary, Field Guide seeks to makes self-guided visits to the GGNRA more impactful learning experiences by:

Activating thoughtful, purposeful observation during the learner's visit through the use of a treasure hunt-like "Checklist," which adapts to their interests and location.

Guiding the learner's development of contextual understanding of what they see and linking new experiences to prior knowledge through app-based scaffolding.

Enabling the user to remember and record their sightings in a comprehensive "Field Journal" that can be used as a jumping-off point for further investigation post-visit.

Features and Functions

Checklist. For each visit (or multiple times per visit), a "checklist" is generated that provides the user with a list of physical "artifacts" to look for in the park. I apply the term "artifacts" very broadly to refer to flora, fauna, rocks, buildings, place names, and general landscape features, objects within the living, breathing museum that is the GGNRA. Each artifact would be selected for inclusion in the app due to its significance to the park. The main checklist screen would have a list of thumbnails and names, which would be categorized by type (e.g., birds; trees; buildings) as well as by topic or theme (more below).

Although there may be as many as a hundred artifacts that could be included on these checklists, each checklist would be filtered down to a manageable length and tailored to a specific user and a specific visit. This filtering would occur adaptively, automatically, and continuously, based on information about the users' interests, as well as their location and season. (These features are described in detail below.)

"Hot and cold" visual feedback to provide clues about artifact locations. Using anonymous, crowd-sourced data from previous Field Guide visitors, the app determines when the user is physically close to the GPS locations of previous sightings of artifacts in the checklist. The app's interface utilizes color-coding on those items to show when the user is "hot" or "cold" in relation to that artifact. This serves as a subtle cue and clue to the user to make an extra effort to keep an eye out for these items. This makes the app appear visibly responsive and dynamic, providing subtle prompting and extrinsic motivation for the user's observations.

Adaptive filtering based on the user's interests. At any time, a user can visit an "Interests" screen where they will express their degree of interest in different topics or themes through an interest exploration activity (described below). A first-time user will be prompted to enter this screen when they first open the app. The app will "learn" the user's preferences and this will instantly affect which artifacts are displayed in the checklist. These preferences may also be revised if the user revisits the interest exploration activity multiple times.

The user completes fun and brief (ca. 2 minutes) activity through which the app "learns" the user's tastes or preferences based on their reaction to content that is presented to them, similarly to Netflix or Amazon recommendations. The user is presented with a series of images and a brief question or prompt intended to capture their curiosity about an artifact. Example: an historical engraving of Miwok Native Americans rowing in canoes is accompanied by the text: "Which plant did the Miwok use to construct their canoes, and why?" Representative items are presented in turn for each theme or topic within the app's content: these include both content-specific topics (native flora & fauna, military history, Native Americans) and cross-disciplinary themes (e.g., Freedom, Justice & Equality). A la Tinder, the user is instructed to swipe right if this item, topic, or theme captures their interest, or swipe left if they'd rather learn about something else. The user must respond to a minimum number of questions (approximately five or six) that cover each of the major topics and themes. The user will be guided through the activity by a progress bar indicating how many more items have to be rated (e.g., "2 out of 5 completed"). This activity serves both to prime the users' schema and focus their attention towards certain ideas or artifacts, while beginning to engage their curiosity and motivation for discovery.

Continual, automated filtering based on location and season. Either through GPS location awareness or manual entry, the particular area of the GGNRA park that the visitor is nearest to would be identified in the app (and confirmed with the user). The visible content would then be filtered according to what artifacts are most likely to be encountered in that location (the artifacts that will be encountered in the Marin Headlands may be completely different than that which is encountered at Alcatraz). Furthermore, out-of-season flora and fauna will be filtered so the visitor can focus on what they are most likely to encounter. This filtering would continue to occur throughout travel through the park, so that when the user moves between areas—e.g., if they begin their day at Alcatraz then travel to the Marin Headlands—relevant items are removed or added to the checklist dynamically (preceded by the request for a manual confirmation from the user of this location change).

Artifact descriptions. Each artifact on the checklist would contain at least 1-2 sentences (not more than a paragraph) of text: easily understood summaries of expert interpretations from historians and scientists explaining the artifact's features and special significance. Descriptions can be viewed by tapping the artifact's thumbnail on the checklist screen. The goal of these descriptions is to provide something than can be read and digested in less than one minute, enabling the user to get back to their in-the-moment experience as soon as possible while being able to get an initial and meaningful impression of the significance of the artifact. Each artifact would be labeled with two or more categories. These would relate back to the topics and themes experienced in the "Interests" activity (described above).

Recording sightings. From either the checklist or the artifact description screen, each artifact may be "checked off" one or more times during a visit. Whether an artifact has been sighted, and how many times it has been sighted, will be immediately visible from the main

checklist menu (with a "checkmark" icon and, if applicable, a number). Sightings are saved in the app for future visits: e.g., if the user visits a different trailhead on another day, the app will display sightings from previous visits so the user can recall whether they've seen a particular item previously at a different location.

Saving notes and photos. Each time a sighting is recorded, the user is given the opportunity to make notes and/or attach photos, which are saved to their "Field Journal." Additionally, at any time (accessible via the main Checklist screen and Field Journal screens) the user may add notes and photos to their Field Journal *outside* of the context of a sighting, enabling free-form note taking about their experience.

View Field Journal. At any time, the user may view their Field Journal to see a report of their sightings and notes during that visit and/or during their lifetime use of Field Guide.

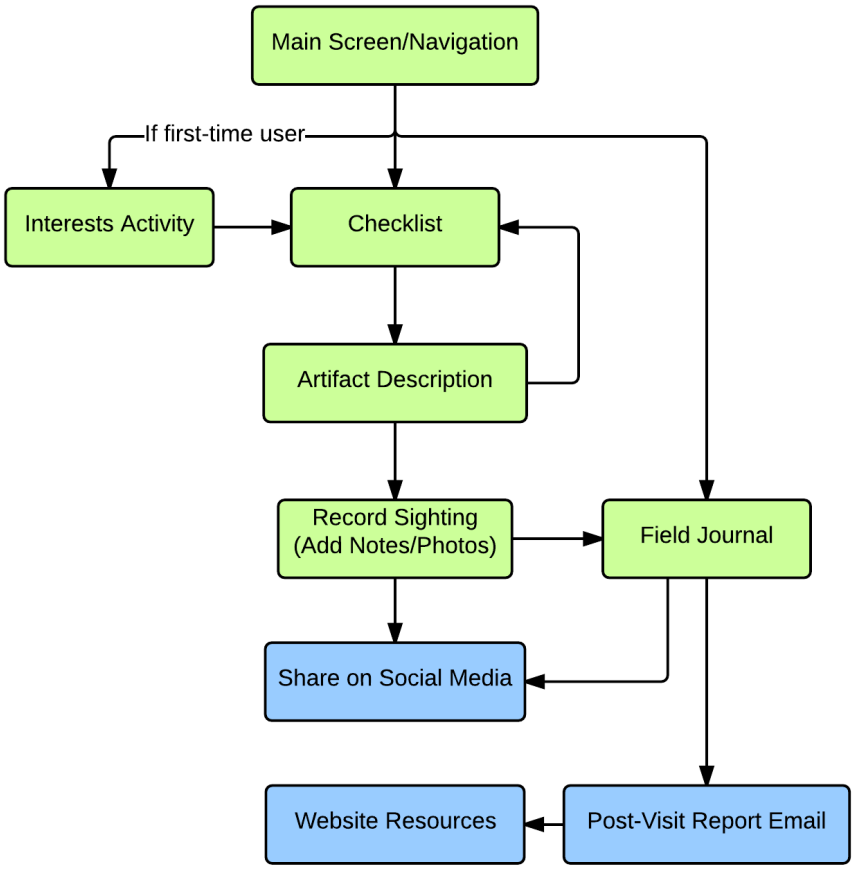
Share Field Journal entries on social media. Additionally, they are given the opportunity to share any of their "Field Journal" entries on the social media accounts on their phone (Instagram, Twitter, Facebook, etc), either during saving or while viewing an entry after the fact. This quick-and-easy opportunity for users to share their observations with friends provides additional intrinsic motivation for users to record entries and has the potential to generate conversation about their experience "offline" and offsite.

Post-visit report and further learning. During a set number of hours after the user's last recorded sighting, the user will receive an automatically generated, graphics-rich email including with a complete report from their visit, including:

a. **Your Sightings**: A chart or diagram summarizing when and where all of their sightings occurred and which artifacts the user saw.
b. **Field Journal**: Notes or photographs that were saved with sightings.

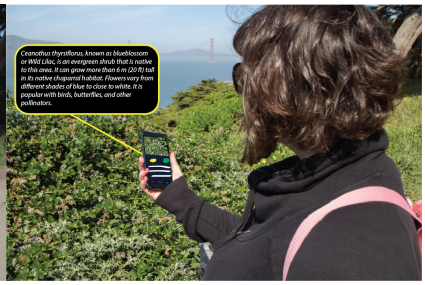
c. **Learn More**: Links for each item the user saw, which may lead them to content on the Field Guide website or elsewhere on the Internet enabling them to further explore an item of specific interest.

d. **Keep Looking**: The final portion of the email summarizes all of the artifacts that had appeared on their checklist during that visit that they *didn't* find, with thumbnails and names. Clicking any of these artifacts lead the user to an artifact "profile" on the Field Guide website that provides additional information about any of these artifacts, along with a map pinpointing the exact locations where other Field Guide users have spotted this artifact. For the repeat visitor, this feature serves as a reference for future visits. For the one-time visitor, however, this feature can still provide useful "filling-in-the-gaps" for gaining deeper and broader context for the location they visited, even if they didn't see certain artifacts on-site.



1. Megan, a 31-year-old who lives in Oakland, is walking along the Land's End trail. She reviews her custom checklist on *Field Guide.*

2. Megan notices some particularly attractive blue flowers by the side of the trail, which she thinks she saw on her checklist.



3. Comparing the plant in front of her with the description on her phone, she confirms that it's Blue Blossom (Ceanothus thyrsiflorus).

4. Megan records the sighting.

5. She adds a typed note with the sighting to her Field Journal.

Theoretical Foundations

Place-Based Learning

It is an essential component of Field Guide that it be used on-site and out-of-doors, rather than at home or in a classroom. The theory of Situated Cognition (Brown & Collins, 1989) states that knowledge is inextricably situated within the activity and context through which it is developed. Field Guide leverages this phenomenon by maximizing proximity, both temporal and spatial, between relevant contextualizing expert information (in the app) and the subject of interest. This feature of the design also acknowledges learners' tendency towards *encoding specificity* (Martinez, 2010, p. 70), in which the memory of material that is learned may be to some degree linked to the physical surroundings in which it was learned.

Perception

It is quite possible that a visitor to the GGNRA would simply not perceive, never mind remember, certain features of their physical environment if they were not actively looking for them or aware of their significance. Rumelhart has stated that, "perception is goal directed…we actively seek information relevant to our current needs and goals" (1980, p. 51). Furthermore, "just as expectations (embodied by certain activated schemata) can serve an important function in guiding our process of interpreting input that happens to reach our sensory organs, so these same schemata guide our *information seeking*" (Rumelhart, 1980, p. 51). Therefore, when utilizing Field Guide's "Checklist," learners will be primed by a combination of image and text to perceive relevant information about their surroundings.

Scaffolding

Learners will become better equipped to recognize relevant artifacts with the aid of scaffolding, in the form of brief visual and verbal descriptions accompanying each item in the app's checklist. With this expert information acting as guidance, the learner enters a Zone of Proximal Development (Vygotsky, 1933/1978) in which they can, to some degree, adopt the role of botanist, geologist, or historian, and begin acquiring familiarity with relevant concepts.

Zimmerman & Land (2014) have outlined several guidelines for "facilitating place-based learning in outdoor informal learning environments with mobile computers." Their second guideline, "Amplify Observations to See the Disciplinary-Relevant Aspects of a Place," notes the benefits of providing expert knowledge to "highlight important cultural, ecological, geographical, historical, and/or geological aspects of a place so learners compare and contrast characteristics to build explanations" (Zimmerman & Land, 2014, p. 79). The following is a relatively simple example of how this approach would be articulated in Field Guide:

While a given user may not know what a Silver Lupine (*Lupinus albifrons*) flower looks like, they will likely have seen other kinds of purple flowers or possibly other kinds of lupines or other plants with similar flower structures. The in-app description of this artifact might provide three photographs showing the plant from different angles and lighting; a brief description of the flower's appearance, size, and where it is likely to be found, as well as its history (is it native? If not, when was it introduced? Was it used by the Native Americans? Does it have any special symbolism today?). This would be compared with images of similar but different plants that the user might have seen in other locations, along with brief textual descriptions of how the Silver Lupine differs, in order to help the user distinguish between different flowers that appear identical to the untrained eye.

Schemata and Activation of Prior Knowledge

The images and text in artifact descriptions should be designed to activate the appropriate schema ("flower") and sub-schema ("purple flowers," "native plants"), thereby priming the user's attention and helping them integrate new information with prior knowledge—a key characteristic of active learning in Mayer's Cognitive Theory of Multimedia Learning (Mayer, 2014, p. 51). While these kinds of classifications may be presented in conventional field guides or brochures, the app would be able to provide much more helpful contextual information than is typical in an analog field guide by comparing several similar plants and presenting multiple images (possibly through a "carousel" interface) to aid recognition. Additionally, only the artifacts likely to be encountered by the visitor in their particular location and season will even be displayed (again, very different from an analog field guide).

Memory and Future Learning

Field Guide would make new information about the GGNRA, and the learning experience itself, highly memorable. From an information processing perspective, use of the Field Guide mobile app would help the learner to store new information into long-term memory (Paas & Sweller in Mayer, 2014, p. 29-30) through the repeated reinforcement of content: seeing an item on the checklist; seeing/reading its description; looking for it in the surroundings; recording a sighting; note-taking; and reading a post-visit report. Additionally, making new information memorable requires a process of interpretation because, as, Rumelhart has noted, "we remember our interpretations of an event or text rather than the text or event itself" (p. 49, 1980). By prompting the user to interpret their experience of the park through the lens of the

provided "checklist" and to make notes about what they see, Field Guide promotes active interpretation through self-recording of observations.

The item descriptions in the app need to be extremely brief and to-the-point, and understandable to the lay-reader, both in order to minimize time spent with the screen and in order to operate within the limitations of working memory, which has been found by Alan Baddeley to hold and manipulate up to four items of novel information at a time (Weinschenk, 2011, p. 48). This constraint is answered by the aforementioned "post-visit report" feature, which takes the form of an email to the user summarizing their sightings and notes and directing them towards additional learning resources. Once the user has already created a new sub-schema for "battery," organized it into their existing schemata for "building" and "military," and seen what a battery looks like and read briefly what it was used for—at least within the particular context that the user encountered it within the GGNRA—in the future they will be well-prepared to recall this information from long-term memory and read an online article provided for them that details the function of batteries built at the Golden Gate, for example.

Using Thematic Organization to Reinforce Comprehension

The themes and topics used to customize user checklists and to categorize individual artifacts would also act as comprehension and memory aids. In their aforementioned guidelines for place-based learning, Zimmerman & Land (2014, p. 79) recommended presenting classificatory or organizational schemes helping learners to understand the significance of places. This kind of organization may also effectively "chunk" information for the user, which would help the user to group together several items of information into single units within their working memory (Martinez, p. 64)—similarly to how a lesson plan or lecture might be organized into

different topics, thereby enabling them to consider many concepts at once. By encountering multiple objects with the same categorization (e.g., "The Ohlone People"), the learner may become aware of emerging patterns (e.g., various natural materials Ohlones used to make their clothing, tools, and homes) and be able to contextualize new information more quickly.

Prototype & User Testing

Using Adobe InDesign, I created an Interactive PDF prototype of key screens and features in Field Guide to test the overall clarity, appeal, and perceived usefulness of the design concept, as well as a preliminary approximation of the user interface. In early May 2015, I tested the prototype separately with two individuals representative of my target audience: Burt, a 68-year-old man, and Megan, 31-year-old woman. Both participants have lived, or live, in the San Francisco Bay Area and have visited the GGNRA many times for recreation, but are not highly knowledgeable about the natural and social history of the GGNRA and do not have expertise in the relevant knowledge domains touched upon in Field Guide. The key findings from this prototype testing are described below.

Both Burt and Megan stated they could envision themselves wanting to use the app on future visits to the GGNRA. On the whole, they felt that the one-the-spot, easy-to-understand expert guidance about what they are seeing in front of them would be very enjoyable to use and would create a memorable learning experience. Burt likened this aspect of the app to a naturalist-led summer program he had taken back in college, which was one of his most rewarding learning experiences.

They also both felt that the Interests activity was a fun and clearly understandable way in which to filter items on the checklist. Burt and Megan made different choices about what topics

they would "swipe right" on, indicating to me that there is enough variety and distinction in the topics presented to allow for deviations between users. While Megan especially liked the overall accessibility and appeal of the concepts information being presented in the Interests activity and the "invitational" aspect of the prototype, which presented a first-time use scenario, she also envisioned wanting more complex information to emerge over multiple uses: i.e., the "Interests" activity might eventually begin presenting more complex topics and ideas (several different types of plants, for example).

There were a couple points of confusion for both Burt and Megan in the Checklist user interface. It was not initially clear to them what the eye icons with green circles with numbers indicated, or what the hot/cold colors represented (they thought that perhaps the green numbers indicated priority or importance). Once I explained that the numbers indicated number of sightings recording, and that hot/cold colors represented physical proximity to the item (based on GPS locations of previous user sightings), these functions seemed logical and appealing. Some adjustments to the user interface design will be needed to make the sighting number less distractingly prominent, and to clarify its function, as well as to provide hints or "key" to explain the function of the color-coding.

The continually updating dynamic Checklist was also an appealing mechanic. Megan liked the idea of the list changing as she moved through the park, because it would encourage in-the-moment appreciation of what she was seeing right there and then—rather than encouraging arbitrary mastery of a static list of items (typical of what she has seen in "gamified" apps). Burt did not initially perceive the implied automated location-sensing component of the app and Checklist, which suggests that some kind of tutorial or additional introductory or "hint" text might be necessary for this functionality of the app to be apparent to users.

Megan had very interesting suggestions for additional features. While she agreed that there shouldn't be too much information up front about an item's location (i.e., a map) so as to enable true discovery, Megan felt she would want a "distress button" of sorts—some kind of clue that would help her find a nearby item that she was struggling to spot. She imagined herself becoming frustrated if she got stuck looking for something and couldn't receive additional guidance. Additionally, Megan observed that a "checklist" might not be the most effective metaphor: it implies that completion of the checklist is equivalent to "winning" and an incomplete checklist is a failure, which is certainly not the intention behind the design. She felt that a different metaphor, placing greater emphasis on the open-endedness of the "scavenger hunt" experience rather than a list of tasks, would be preferable.

Conclusion

Field Guide prompts users to 1) look for specific physical features in the GGNRA related to their self-described interests; 2) recognize those features on-site; 3) record their sightings in the app; 4) make notes or attach photographs to their sightings; and 5) access a record of their sightings and notes after-the-fact, along with supplementary learning materials targeted to their visit. By using the app in this way, learners will participate in active information seeking, making them more perceptive visitors to the park and causing them to remember much more of what they experience. Additionally, users will be guided towards identifying salient features of the artifacts they encounter without prior domain-specific expertise. Furthermore, the organization of content within the app will reinforce thematic connections between related artifacts and overarching interpretive narratives, aiding the formation of relevant associations between concepts and the learner's interpretations of their observations.

The proposed design is relatively streamlined, following the maxim "less is more"—especially when applied to self-directed, place-based learning in which a user's interaction with the app may be competing with all kinds of other stimuli and interactions with the environment and other people. However, additional features in Field Guide could effectively enable more fully personalized learning and also social learning. In particular, there is the potential for layering scaffolding for more or less advanced users: if a user has some existing background in a particular discipline, for example, perhaps the item descriptions could be dynamically adjusted to meet the user's level. Additionally, perhaps the user could have the ability to curate "tours" of GGNRA by creating their own groupings of artifacts around a certain theme and/or location, thereby furthering the goal of individual interpretation. When used in a group setting, particularly field trips, perhaps individual users' "Field Journals" could even be combined to generate a collaborative report on the group's visit. Once the essential components of the app have been implemented and refined, these additional features are deserving of consideration for future iterations of Field Guide.

Addendum: Revisions in Response to Instructor and Peer Feedback

I made the following additions and revisions to my design, document, and resulting prototype, in response to feedback I received on a first draft from Professor Maaike Bouwmeester and Heather Kim.

The Interests activity, in which the user teaches the app what they're interested in by swiping left/right, was added in response to Prof. Bouwmeester's suggestion for a "playful activity" to initiate the experience and prime the user's schema.

Additionally, in my description of the checklist's feature, I added more specific language clarifying how the checklist is adjusted based on location.

In response to Ms. Kim's question about where content in the app is coming from, I added clarifying language in the first paragraph of the Design Solution ("expert-prepared factual information") and under Artifact Descriptions ("easily understood summaries of expert interpretations from historians and scientists explaining the artifact's features and special significance.")

In the narrative description of my design, I added the feature to create "notes" in the Field Journal unrelated to checklist sightings, in response to Prof. Bouwmeester's feedback. I realized this was a missed opportunity to easily provide a secondary function to the app: free-form note taking. This feature, it should be noted, was beyond the scope of the prototype

In response to Prof. Bouwmeester's feedback to provide users with access to more useful information post-visit, I also added the "Keep Looking" feature to the post-visit report email.

I also added the "Hot and cold" visual feedback, which provide clues about artifact locations, in response to Prof. Bouwmeester's feedback about enhancing the "scavenger hunt" dimension of the design.

Both Ms. Kim and Prof. Bouwmeester were interested in seeing me incorporate more social elements into the app. Although I agree that it may be fruitful to expand the social functions of the app, I decided not make this a core element of my design, which I'm envisioning as an individual-focused experience. I did, however, decide to add the ability to share Field Journal entries via social media. I realized that this would eliminate the need for users to exit and re-enter the app when they wanted to post a Tweet or Instagram—furthermore, they might then be *more* inclined to share on social media. This feature could initiate out-of-app dialogue with

friends about what they saw. I also incorporated crowd-sourced data about sighting locations into the aforementioned "hot and cold" clues and post-visit report "Keep Looking" features.

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